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PB-294 014

A DIRECTORY OF
COMPUTER SOFTWARE APPLICATIONS

PENNSYLVANIA STATE UNIVERSITY
JUL 16 1979
DOCUMENTS COLLECTION

Marine Engineering

1970-April, 1979

NTIS U.S. DEPARTMENT OF COMMERCE—National Technical Information Service

A DIRECTORY OF

COMPUTER SOFTWARE APPLICATIONS

Marine Engineering

1970-April, 1979

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

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CONTENTS

Introduction... V
How To Use... VII
Abstracts... 1
Subject Index... 33
Corporate Author Index... 45
Order Blank .... At End

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REPORT DOCUMENTATION PAGE	1. REPORT NO. NTIS/SA-79/06	2.	3. Recipient's Accession No. PB-294 014

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Marine Engineering reports that list computer programs and/or their documentation are cited. These software applications pertain to topics such as ship hull design, propeller design, hydrodynamics of ship motion and mooring cables, and ship maintenance management. The directory contains complete bibliographic data for each report as well as a subject and a corporate author index.

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HOW TO USE

Abstract Entry

Order/accession number. This number must be used to order NTIS products

Corporate author

Keywords — used for indexing and searching

PB-239 100/1CP PC **A12**/MF **A01**
Bechtel, Inc., San Francisco, Calif.
Path to Self-Sufficiency Directions and Constraints. Appendices
Final rept. on Phase 1.
Aug 74, 267p* Rept no. BECHTEL-10900-74-43-I-App
Grant NSF-C867

Descriptors: *Energy supplies, *Computer programs, Crude oil, Natural gas, Coal, Oil shale, Uranium, Thorium, Bituminous sands, Hydroelectric power generation, Geothermal prospecting, Solar energy conversion, Wastes, Systems analysis, Systems engineering, Capitalized costs, Fossil fuel deposits, Transportation, Planning, Forecasting, Algorithms, Flow charting, Mathematical models, FORTRAN.

A computer program that calculates resource requirements and summarizes results for any fuel mix is presented. The program tabulates an annual schedule of required facilities to be brought on-line and attendant annual schedules of capital (2 classes), manpower (4 types), and materials (9 categories) requirements. The model is exercised for two likely fuel mixes and the implications in terms of anticipated capital, manpower, and materials constraints are discussed.

Price codes: PC means paper copy; MF, microfiche. Consult current code-price table for actual prices.

Title of document

Abstract of document

Subject Index Entry

Subject Term.—These are arranged in alphabetical sequence in the Index

ENERGY SUPPLIES
Energy System Network Simulator (ESNS). Ii. A User's Guide
BNL-20979 9B
Path to Self-Sufficiency Directions and Constraints
PB-239 099/5CP
Path to Self-Sufficiency Directions and Constraints. Appendices
PB-239 100/1CP 21D
An Economic Analysis of Declining Petroleum Supplies in Texas: Income, Employment, Tax and Production Effects as Measured by Input-Output and Supply-Demand Simulation Models
PB-243 320/9CP 08I

Title

Order number. Documents in the abstract section are sequenced alphanumerically by this number.

Corporate Author Index Entry

Corporate author

Order/accession number

BECHTEL, INC., SAN FRANCISCO, CALIF.
BECHTEL-10900-74-43-I
Path to Self-Sufficiency Directions and Constraints
PB-239 099/5CP 21D
BECHTEL-10900-74-43-I-App
Path to Self-Sufficiency Directions and Constraints. Appendices
PB-239 100/1CP 21D

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A11	9.50	E11	22.50	T11	600.00
A12	10.75	E12	25.00	T12	650.00
A13	11.00	E13	28.00	T13	675.00
A14	11.75	E14	31.00	T14	750.00
A15	12.00	E15	34.00	T15	800.00
A16	12.50	E16	37.00	T16	850.00
A17	13.00	E17	40.00	T17	900.00
A18	13.25	E18	45.00	T18	950.00
A19	14.00	E19	50.00	T19	1,000.00
A20	14.50	E20	60.00	T99	*
A21	15.00	E99	*		
A22	15.25				
A23	15.50	N01	28.00		
A24	16.25	N02	50.00		
A25	16.50				
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MARINE ENGINEERING

AD-A001 277/3CP PC **A03**/MF **A01**
Naval Ship Engineering Center Philadelphia Pa Philadelphia Div
A Synchronous Generator/Voltage Regulator Simulation for the Digital Computer
Final rept.
R. C. Dalton. 8 Nov 74, 45p Rept no. NAVSECPHILAD-C-69-IV

Descriptors: *Alternators, Voltage regulators, Computerized simulation, Digital computers, Transfer functions, Naval equipment, Shipboard, Computer programs.

The report describes the simulation for a digital computer of a modern 2000 kw synchronous generator system currently used aboard several classes of naval vessels. The report includes a brief discussion of the machine theory which forms the basis for the simulation. The simulation is readily adaptable to other generator systems. The report illustrates an application of the integration subroutine DIFSUB previously developed at NAVSECPHILADIV. This algorithm has been found to permit shorter computing times than the better-known Runge-Kutta or trapazoidal integration schemes when modeling 'stiff' systems (systems whose principal time constants differ by an order of magnitude or more). The simulation has been run on a digital computer and has been found to perform in a manner similar to the real machine.

AD-A001 279/9CP PC **E02**/MF **A01**
Naval Coastal Systems Lab Panama City Fla
The Midcohv Weight and Balance Computer Program (WTBAL)
Informal rept.
K. W. Watkinson. Sep 74, 30 Rept no. NCSL-220-74

Descriptors: *Underwater vehicles, *Hydrodynamic codes, Buoyancy, Displacement, Moment of inertia, FORTRAN, Hulls(Marine), Computer programs.
Identifiers: WTBAL computer program, Finite element analysis.

A FORTRAN computer program for evaluating the mass distribution and displacement characteristics of any submerged axisymmetric vehicle is presented. Given the body offsets, hull section materials and thicknesses, and component descriptive data, program WTBAL computes the center of gravity and center of buoyancy locations, the vehicle and displaced water moments of inertia, vehicle weight, buoyancy, and surface area.

AD-A001 377/1CP PC **A08**/MF **A01**
Aluminum Co of America Alcoa Center Pa Alcoa Labs
Considerations for the Structural Detailing of Aluminum Ships. Guidelines for the Conversion of CASDOS
Final rept. 5 Aug-20 Nov 74
P. B. Dickerson, J. E. Grant, M. L. Sharp, N. P. Wolff, and G. P. Yanok. 20 Nov 74, 160p*
Contract N00024-75-C-4012

Descriptors: *Shipbuilding, *Aluminum alloys, *Ship plates, Marine engineering, Welded joints, Welding, Metalworking, Computer applications, User needs.
Identifiers: CASDOS computer program, *Aluminum ships.

The CASDOS computer program has been initially developed and proven on steel construction. It is the desire of the Naval Ship Engineering Center to modify CASDOS for the detail design of all-aluminum boats and ships. This report attempts to provide the designer and computer programmer with background information on the peculiarity of aluminum ship details and aluminum construction methods. No experimental work was done in the preparation of this report. Rather the report is a compilation of the knowledge and experience of Alcoa engineers and designers who have worked on various aluminum marine construction projects.

AD-A001 673/3CP PC **A06**/MF **A01**
Battelle Columbus Labs Long Beach Calif Long Beach Research Facility
A Study of Parameters That Influence Wire-Rope Fatigue Life
Final rept. 19 Jun 72-31 Oct 74
P. T. Gibson, F. G. White, L. A. Schalit, R. E. Thomas , and R. W. Cote. 31 Oct 74, 123p Rept no. BATT-G-1689
Contract N00024-72-C-5427

Descriptors: *Wire rope, *Fatigue tests(Mechanics), Elongation, Failure, Fatigue life, Tensile strength, Analysis of variance, Naval equipment.

The objective of this research program was to investigate the influence of various parameters on the fatigue life of wire rope through well controlled and statistically planned laboratory bend-over-sheave fatigue experiments. Parameters studied included three operating loads for ropes subjected to both simple single-sheave bending and two-sheave reverse bending. A total of 288 rope specimens were cycled to failure, and the results were analyzed statistically to determine which parameters had a significant influence on rope life.

AD-A001 682/4CP PC **A03**/MF **A01**
Naval Ship Research and Development Center Bethesda Md
Forced Vibration Calculation Using General Bending Response Program (GBRP) and the Fast Fourier Transform
Final rept.
Francis M. Henderson. Aug 74, 49p Rept no. NSRDC-4481

Descriptors: *Ships, *Vibration, Ship hulls, Bending moments, Response, Fourier transformation, Digital simulation, Computer programming.
Identifiers: GBRP computer program, Finite difference analysis, Fast Fourier transform, Transient response.

A new capability for calculating the transient response of non-uniform beam-spring models has been incorporated into the General Bending Response Program (GBRP), a digital computer program package used for ship vibration analysis. This method, which replaces the previously existing one based upon a Fourier transform approach, uses a Fourier series representation of the excitation force and response, and considers transient forces as periodic with sufficiently long periods.

AD-A001 750/9CP PC **A09**/MF **A01**
Massachusetts Inst of Tech Cambridge Dept of Ocean Engineering
Hydrodynamics of a Body of Revolution with Fairwater and Rudders at a Constant Angle of Attack
Final rept. Oct 71-Mar 74
Joseph Luckard, Jr. Mar 74, 196p Rept no. QE-74-8
Contract N00014-67-A-0204-0058
See also report dated Jun 73, AD-776 196.

Descriptors: *Submersibles, *Lifting surfaces, *Hydrodynamics, Angle of attack, Vortex shedding, Lift, Drag, Hydrodynamic control surfaces, Water tunnels, Computer programs, FORTRAN.
Identifiers: *Fairwaters.

An investigation is made of the hydrodynamic forces and moments on a submerged body of revolution, resulting from the addition of an assymmetric fairwater and hull-control surfaces, and the results of their interaction. Experimental, flow visualization, numerical, and analytical approaches are described.

AD-A003 009/8CP PC **E04**/MF **A01**
Massachusetts Inst of Tech Cambridge Dept of Ocean Engineering
Unsteady Hydrodynamics of a Body of Revolution with Fairwater and Rudder
Final rept. Oct 71-Mar 74
Douglas P. Glasson. Mar 74, 130p Rept no. 74-7
Contract N00014-67-A-0204-0058

Descriptors: *Submarine hulls, *Hydrodynamics, Submarines, Lifting surfaces, Vortices, Hydrodynamic control surfaces, Wake, Interactions, Computer programs, FORTRAN.
Identifiers: FORTRAN 4 programming language.

Potential flow models are developed for a submerged body of revolution with fin and rudder appendages. Forces and moments on the lifting surfaces and hull have been predicted at a steady angle of attack. The procedure is extended to the time dependent angle of attack case. Experimental, analytical and numerical approaches are described.

AD-A003 788/7CP PC **A07**/MF **A01**
Naval Postgraduate School Monterey Calif
Maneuvering Characteristics of Automatically Controlled Ships with Directionally Unstable Hulls
Master's thesis
Andreas G. Hozos. Dec 74, 143p

Descriptors: *Ships, *Maneuvers, Instability, Ship hulls, Ship motion, Rudders, Dynamic response, Equations of motion, Maneuverability, Computer programs, Theses.
Identifiers: *Ship maneuvers, DSL/360 programming language.

The stabilization of a dynamically unstable ship and the maneuvering characteristics of the combination unstable -stabilized ship were studied using the linear and non linear equations of motion of a ship. The Digital Simulation Language (DSL/360) was used to simulate the dynamics of the systems.

AD-A004 554/2CP PC **A05**/MF **A01**
Oceanics Inc Plainview N Y
Theoretical Estimates of Wave Loads on the SL-7 Container Ship in Regular and Irregular Seas
Final rept.
Paul Kaplan, Theodore P. Sargent, and John Cilmi. 1974, 77p 73-96, SSC-246
Contract N00024-70-C-5076

Descriptors: *Cargo ships, *Ocean waves, Ship hulls, Loads(Forces), Sea states, Bending moments, Shear stresses, Computer applications.
Identifiers: SL-7 vessel, *Containerships, Computer aided analysis, SCORES computer program.

The computer program SCORES for predicting ship structural response in waves is applied to the SL-7 container ship. The operating conditions considered are 2 displacements, 4 ship speeds, 21 wavelengths, 19 headings and 5 sea states assuming both long-crested and short-crested seas. These results constitute a complete data bank for the SL-7 ship in the form of both frequency responses for regular waves as well as rms and other statistical response measures for irregular seas.

AD-A004 616/9CP PC **A07**/MF **A01**
Naval Postgraduate School Monterey Calif
Refinements of the Seal Subroutines and Fan Air Flow Maps for the XR-3 Loads and Motion Program
Master's thesis
Robert Alexander Finley. Dec 74, 146p

Descriptors: *Ships, *Air cushion vehicles, *Lift fans, Air bubbles, Pitch(Motion), Roll, Computer programs, Theses.
Identifiers: XR-3 vessel, Captured air bubble ships.

Refinements to the bow and stern seal subroutines of the XR-3 Loads and Motion computer program are made. New lift fan performance maps are developed and presented. Comparison studies of simulated performance of the original XR-3 model with the old and new fan maps are made under varying sea conditions. Measured roll and pitch transient behavior of the XR-3 test craft in calm water is compared with the simulated response of both the original and the new model. In addition, simulated performances of the original and new models in irregular ahead seas are compared.

AD-A004 621/9CP PC **A04**/MF **A01**
Naval Ship Research and Development Center Bethesda Md Ship Performance Dept

Recommended Vehicle Concepts for Waterjet Propelled High-Performance Vehicles
Final rept.
L. T. Ravenscroft, Jr, and P. B. Mathis. Dec 74, 56p Rept no. SPD-572-01

Descriptors: *Surface effect ships, *Hydrofoil craft, *Marine surface propulsion, *Hydraulic jets, Jet propulsion, Aerodynamic drag, Lift to drag ratio, Planing surfaces, Skin friction, Computer programs, FORTRAN.

A rapid method is developed for providing first order estimates of the smooth water powering and weight characteristics of SES, hydrofoil, and planing craft concepts employing waterjet propulsors. A computer program utilizing this method and applicable to SES concepts is included.

AD-A005 463/5CP PC **A06**/MF **A01**
Naval Postgraduate School Monterey Calif
The Simulation of Hydrofoil Performance
Master's thesis
Jitt Na Nagara. Dec 74, 101p

Descriptors: *Hydrofoil craft, *Hydrodynamics, Digital simulation, Hydrofoils, Pitch(Motion), Angle of attack, Transfer functions, Computer programs, Theses.
Identifiers: PCH 1 vessel, IBM 360/67 computers, DSL programming language.

The behavior of a fully-submerged hydrofoil has been studied by using Root Locus technique. A multivariable concept was used in designing the compensators of the system. A digital computer simulation program using Digital Simulation Language or DSL is produced to study the performance on the digital computer IBM system 360/67. The Highpoint PC(H)-1 is used as the model of this simulation.

AD-A005 487/4CP PC **A13**/MF **A01**
Boeing Co Seattle Wash
Hydrofoil Analysis and Design Program (HANDE)
Final rept. on Phase O
A. J. Brennan, J. D. Burroughs, W. C. Hurt, E. Wichert, and D. Wacker. 1974, 287p Rept no. D221-51302-1
Contract N00600-73-C-0450
See also AD/A-005 488.

Descriptors: *Hydrofoil craft, *Computer aided design, Hydrofoils, Struts, Ship hulls, Marine surface propulsion, Hydrodynamics, Computer programs.
Identifiers: HANDE computer program.

A digital computer program, Hydrofoil Analysis and Design (HANDE), for use in the feasibility and early preliminary design of hydrofoil ships has been defined in detail under Phase O of Contract N00600-73-C-0450. This program includes sixteen integrated, technology oriented computational modules which function under a controlling executive program. A computerized data bank facilitates program input and forms a depository for hydrofoil ship data. All HANDE functions may be performed interactively as well as through batch operation. This document describes in detail the design procedure and approach to be taken in the development and implementation of HANDE.

AD-A005 488/2CP PC **A09**/MF **A01**
Boeing Co Seattle Wash
Hydrofoil Analysis and Design Program (HANDE)
Final rept. on Phase O extension
A. J. Brennan, J. D. Burrough, D. H. Wacker, and E. O. Wichert. 1974, 197p Rept no. D321-51303-1
Contract N00600-73-C-0450
See also AD/A-005 487.

Descriptors: *Hydrofoil craft, *Computer aided design, Hydrofoils, Struts, Ship hulls, Marine surface propulsion, Hydrodynamics, Computer programs.
Identifiers: HANDE computer program.

This document reports on certain tasks that have been completed on the Hydrofoil ANalysis and DEsign (HANDE) program. Those portions of the HANDE executive and data bank maintenance programs which are required to control the execution of analysis modules are described. Two analysis module subroutines, the Initialization module and the Hull Structural Sizing module, are described and examples of their operation are given. The Initialization module is designed to parametrically generate ship size and configuration parameters for use in the Synthesis Section of HANDE. However, this module may also be used for performing high level trade studies. The Hull Structural Sizing module sizes the hull shell and deck structure to meet specified loading conditions.

AD-A005 650/7CP PC **A07**/MF **A01**
Massachusetts Inst of Tech Cambridge Dept of Ocean Engineering
Wave Resistance of Asymmetric Pressure Distributions Moving in a Canal
Final rept. Mar-Sep 74
C. Chryssostomidis. Aug 74, 128p Rept no. 74-14
Contract N00167-74-C-0113

Descriptors: *Surface effect ships, *Canals, *Waves, Pressure distribution, Ship hulls, Planform, Computer programs, User needs.
Identifiers: Wave resistance.

Expressions are derived for the wave resistance of two asymmetric pressure distributions moving with constant forward speed along the free surface of a canal of constant width and depth. Calculations are made for the case of a rectangular planform with an elliptic or triangular bow with constant pressure, as a function of speed, length to beam ratio, and the width and depth of the canal. The numerical schemes considered for the approximation of the wave resistance of the planform with the elliptic bow are also discussed in some detail.

AD-A007 329/6CP PC **A04**/MF **A01**
Notre Dame Univ Ind Coll of Engineering
Inelastic Response of Ring-Stiffened Cylindrical Shells to External Pressure Shock Waves
L. H. N. Lee, and J. T. Horng. Mar 75, 66p Rept no. UND-75-1
Contract N00014-68-A-0152

Descriptors: *Shells(Structural forms), *Ring stiffened cylinders, *Underwater explosions, *Dynamic pressure, Shock waves, Dynamic response, Plastic properties, Finite difference theory, Stress strain relations, Computer programs.
Identifiers: *Cylindrical shells.

An incremental finite-differences approach based on an absolute minimum principle in dynamic finite plasticity is developed to study the inelastic response of ring-stiffened cylindrical shells to underwater explosions. The pressure in the shock wave caused by an underwater explosion is treated as a prescribed transient load acting on a shell. Numerical results for five cases are presented. The results indicate that dynamic stress concentrations and yielding occur in the shell near the ring stiffeners or other hard points.

AD-A007 489/8CP PC **A05**/MF **A01**
Civil Engineering Lab (Navy) Port Hueneme Calif
The Motion of Floating Advanced Base Components in Shoal Water -- A Comparison between Theory and Field Test Data
Final technical note Jan 72-May 73
D. A. Davis, and H. S. Zwibel. Jan 75, 92p Rept no. CEL-TN-1371

Descriptors: *Forward areas, *Floating docks, *Ship motion, Mooring, Deep water, Shallow water, Heaving, Degrees of freedom, Computer programs.
Identifiers: *Advanced bases, Six degrees of freedom, Strip theory.

As part of the Navy's program to develop mobile port facilities, an analytical model has been developed to compute the relative motion between vessels in regular and random seas. The model, which considers all six degrees of vessel motion, is based on strip theory and is suitable for analyzing all single hull, linearly moored vessels. Ship motion and wave data obtained during recent Offshore Discharge of Containership 2 (OSDOC II) field tests were used to validate the model. The results presented herein suggest that the model closely predicts the absolute motion of ocean going vessels (2,000 tons and larger), but that its predictions of lighter motions when the lighters are in close proximity to larger craft are less accurate. The probable cause of this disparity is hydrodynamic interaction, an effect which is not presently considered in the model.

AD-A008 335/2CP PC **A07**/MF **A01**
Naval Ship Research and Development Center Bethesda Md
Manual: NSRDC Ship-Motion and Sea-Load Computer Program
W. G. Meyers, D. J. Sheridan, and N. Salvesen. Feb 75, 134p Rept no. NSRDC-3376

Descriptors: *Ship motion, *Computer programming, Ocean waves, Dynamic loads, Hydrodynamics, Degrees of freedom, Pressure distribution, Computer programs, FORTRAN.
Identifiers: CDC 6700 computers, Six degrees of freedom.

A description of the 'NSRDC Ship-Motion and Sea-Load Computer Program' is presented. This program computes the six-degree-of-freedom ship motions, wave-induced loads and pressure distribution for a ship advancing at constant speed with arbitrary heading in regular waves. Program organization and structure, data card input and output format are described. A sample computational problem is included to aid in understanding input and output format and to provide a test for proper implementation. A listing of the program, as used on the CDC-6700 computer system at NSRDC, is included.

AD-A008 349/3CP PC **A03**/MF **A01**
Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Prediction of Ship Motions in Regular and Irregular Head Waves
Final rept.
E. N. Hubble, and J. B. Hadler. Apr 75, 31p Rept no. SPD-623-01

Descriptors: *Ocean waves, *Ship motion, Pitch(Motion), Heaving, Ship hulls, Spectral energy distribution, Computer programming.
Identifiers: YF17 computer program.

Current techniques for the prediction of ship motions in long-crested head waves are discussed. Addition of a speed term to the theoretical pitch damping coeffieient is correlated with experimental data. The relationship between absolute and relative motion along the ship length is discussed. Practical limits are established for integrating the spectral density functions for irregular-sea responses. Recommendations are made for updating computer program YF17, computing irregular wave responses with either idealized or real sea spectra such as the Station INDIA data.

AD-A009 804/6CP PC **A04**/MF **A01**
Naval Ship Research and Development Center Annapolis Md Propulsion and Auxiliary Systems Dept
Investigation of Shipboard Distilling Plant Energy Consumption
Research and development rept.
B. H. Rankin, W. B. Huckenpoehler, and W. L. Adamson. May 75, 67p Rept no. PAS-74-60

Descriptors: *Distilling plants, *Ship auxiliary equipment, Drinking water, Fuel consumption, Heat loss, Consumption, Measurement, Computer programs.
Identifiers: Electric power consumption, BASIC programming language.

Technical manual data on shipboard freshwater distillers were used to perform energy balances on various ship distilling units and obtain quantitative figures on the energy consumed to produce desalinated water. Similar energy balances were carried out on distillation systems as installed aboard particular ships. The latter analysis, which used ship design heat balances (or trial heat balances when available) to calculate the energy per pound of water, took into account the interaction between the ship steam propulsion plant and the distillers. The results showed that, for the 12 ships examined, the calculated energy consumption averaged 434 British thermal units per pound of freshwater produced as compared to 601 British thermal units per pound based upon the manufacturer's technical manual data. Boiler and electrical conversion inefficiencies were found to have a measurable contribution to the overall distiller energy consumption.

AD-A011 089/0CP PC **A03**/MF **A01**
Pennsylvania State Univ University Park Applied Research Lab
Computerization of the Mean Streamline Blade Design Method
Technical memo.
Mark W. McBride. 21 Feb 73, 49p Rept no. TM-73-22
Contract N00017-70-C-1407

Descriptors: *Propellers(Marine), *Computer aided design, Turbomachinery, Rotor blades(Turbomachinery), Turbine stators, Streamline shape, Computer programs.
Identifiers: IBM 1130 computers.

The mean streamline method of propulsor blade section design has been adapted to the digital computer. Results agree well with cases previously calculated by hand. The computer solution is rapid and will allow the designer to better optimize his blade shapes. Blade rotation, pre-swirl and sections on conical surfaces are accounted for by the program. Digital output from the program can be applied directly to hardware fabrication procedures without the time consuming digitizing and smoothing previously required.

AD-A012 412/3CP PC **A04**/MF **A01**
Naval Postgraduate School Monterey Calif
Harmonic Motion of Cylinders in Uniform Flow
Master's thesis
James Thomas Fry. Jun 75, 53p

Descriptors: *Cylinders, *Fluid flow, *Vibration, Oscillation, Cables, Mooring, Computer programs, Theses.
Identifiers: *Cable strumming.

The time-dependent force acting on a cylinder undergoing harmonic in-line oscillations in an otherwise steady flow was measured for various amplitudes and frequencies of oscillation and mean flow velocity. The experiments were carried out in a recirculating water tunnel operating as an open channel with a free surface at the test section. The time-dependent force has been expressed in terms of a mean drag coefficient and the Fourier-averaged drag and inertia coefficients and as functions of the relative amplitude and a frequency paramter.

AD-A012 418/0CP PC **A08**/MF **A01**
Naval Postgraduate School Monterey Calif
A Simulation of a Computer Graphics-Aided Aircraft Handling System
Master's thesis
Alan Keith Johnson, and Kriston Philip Woolley. Jun 75, 151p

Descriptors: *Aircraft carriers, *Aircraft, *Handling, Hangar decks, Flight decks, Decision making, Computer graphics, Computer programs, Computerized simulation, Theses, Maintenance personnel.

Previous studies and research have determined that the aircraft handling problem aboard our modern aircraft carriers is needlessly complicated by inadequate communication and information handling. This study develops an interactive computer graphics system which would improve information handling. The proposed system will not make the logical decisions of the handling problem, but rather will assist handling and maintenance personnel in the presentation and exchange of aircraft information. The study includes a discussion of previous efforts in this area, a basic description of interactive computer graphics and presently available hardware, a description of the entire proposed system to be implemented onboard the carrier, and a computer graphics program that realistically simulates the workings of the displays proposed in the above mentioned system.

AD-A012 458/6CP PC **A05**/MF **A01**
Naval Postgraduate School Monterey Calif
Control of Nuclear Propulsion Plant Power Transients
Master's thesis
Howard Maitland Chatham. Jun 75, 76p

Descriptors: *Nuclear propulsion, *Transients, *Computerized simulation, *Marine propulsion, *Power, Naval vessels, Auxiliary, Performance(Engineering), Systems engineering, Models, Mathematical models, Computer programs, Electric power plants, Nuclear reactors, Thermodynamics, Heat transfer, Control systems, Reactor fuel rods, Theses.
Identifiers: *AOR 4 vessel, *Power transients.

The nuclear propulsion plant of the N.S. Savannah is simplified and simulated using Digital Simulation Language. The plant is subjected to an up power transient of sixty-five percent and a down power transient of eighty percent. Constraints are imposed to limit power excursions, minimize reactor coolant hot leg temperature and maximize boiler saturation temperature while maintaining average coolant temperature constant. Combinations of control rod movement and changes in reactor coolant flow rate are studied in order to determine the control systems that best satisfy the constraints and minimize the time to steady state for each transient. (Author)

AD-A012 873/6CP PC **A07**/MF **A01**
Aeronautical Research Associates of Princeton Inc N J
Turbulent Wakes in a Stratified Fluid. Part I: Model Development, Verification, and Sensitivity to Initial Conditions
Final rept.
M. Stephen Lewellen, Milton Teske, and Coleman duP. Donaldson. Aug 74, 132p Rept no. ARAP-226-Pt-1
Contract N00014-72-C-0413, ARPA Order-1910
See also Part 2, AD-A012 874.

Descriptors: *Submarines, *Turbulent flow, *Wake, Fluid dynamics, Turbulence, Numerical analysis, Predictions, Computerized simulation, FORTRAN, Submarine detection.
Identifiers: *Stratified flow, *Turbulent wake, WAKE computer program.

A computational model has been developed for the turbulent wake of a body moving through a stably stratified fluid. Details of the wake growth, collapse and generation of internal waves were examined by the application of a second-order closure approach to turbulent flow developed at A.R.A.P. over the past few years. Predictions of the model have been verified by comparison with a wide variety of wake flows including wakes with no momentum, wakes with axial momentum, wakes with angular momentum, and for wakes in both stratified and unstratified fluids. A sensitivity investigation reveals that the primary variable affecting the strength of the generated internal waves is the initial Richardson number, with the first local maximum of the vertical height of the wake scaling inversely with the 1/8th power of the initial Richardson number.

AD-A012 874/4CP PC **A06**/MF **A01**
Aeronautical Research Associates of Princeton Inc N J
Turbulent Wakes in a Stratified Fluid. Part II: User's Summary Guide to 'Wake' Computer Program
Final rept.
Milton Teske. Aug 74, 117p Rept no. ARAP-226-Pt-2
Contract N00014-72-C-0413, ARPA Order-1910
See also Part 1, AD-A012 873.

Descriptors: *Submarines, *Turbulent flow, *Wake, Fluid dynamics, Turbulence, Numerical analysis, Predictions, Computerized simulation, FORTRAN, User needs, Submarine detection.
Identifiers: *Stratified flow, *Turbulent wake, WAKE computer program.

This document is a part of the final report on Contract N00014-72-C-0413 covering the period May 15, 1972, to June 30, 1974 and contains the user information needed to operate the WAKE program on the A.R.A.P. Digital Scientific Corporation META-4 computer system. Part I of this report summarizes the turbulent model derivation and verification, and the sensitivity of the wake collapse to changes in initial conditions.

AD-A013 194/6CP PC **A07**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
The Pien Wavemaking Resistance Computation Program Part I. Theoretical Basis and Programming Technique
Ruey Chen. Apr 75, 149p Rept no. NSRDC-4370

Descriptors: *Ship hulls, *Ocean waves, Resistance, Hydrodynamics, Mathematical models, Computer programs.
Identifiers: Pien computer program, SWATH vessels, *Wavemaking.

The waves produced at the rear of a ship as it travels at the water's surface are directly related to a component of the ship resistance known as wavemaking resistance. Pien's Wavemaking Resistance Computation Program adapts Havelock's mathematical representation of this phenomenon to provide the ship designer with a relatively quick and inexpensive way of determining the wavemaking resistance of his proposed design. This computer program can also be used in determining the optimum hull form which has the least theoretical wavemaking resistance. Applied initially for the development of small waterplane area twin hull and single hull ships, the Pien program produced predicted wavemaking resistances which compared favorably with those measured from actual experimental model tests.

AD-A013 218/3CP PC **A05**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
The Pien Wavemaking Resistance Computation Program. Part 2. Users Manual
Research and development rept.
Ruey Chen. Apr 75, 82p Rept no. NSRDC-4371

Descriptors: *Wake, *Waves, *Ship hulls, *Computer programs, Catamarans, Planing surfaces, Ship models, Digital computers, Fortran, Drag, Manuals.
Identifiers: CDC 6000 computers, SWATH(Small waterplane area twin hull), Small waterplane area twin hull, Error codes, Pien computer program.

The waves produced at the rear of a ship as it travels through the water's surface are directly related to a component of the ship's resistance known as wavemaking resistance. The Pien Wavemaking Resistance Computation Program adapts Havelock's mathematical representation of this phenomenon to provide the ship designer with a relatively quick and inexpensive way of determining the wavemaking resistance of his proposed design. The program can also be used in determining the optimum hull form which has the least theoretical wavemaking resistance. The Pien program has been used in the development of small waterplane area twin-hull ships and small waterplane area single-hull ships. The wavemaking resistances estimated by the Pien program compare favorably with those measured in actual experimental model tests. The use of the Pien program for the design of other type ships seems promising. The Pien program has been written in CDC FORTRAN Extended and developed for use on the CDC 6000-series computers. The theory underlying the logic of the program has been documented in Naval Ship Research and Development Center Report 4370, 'The Pien Wavemaking Resistance Computation Program - Part 1: Theoretical Basis and Programming Technique.' The use of the program is described in this report. (Author)

AD-A013 320/7CP PC **A02**/MF **A01**
J G Engineering Research Associates Baltimore Md
Sound Radiation from an Orthotropic Plate Supported by a Double Set of Stiffeners
Interim technical rept.
Joshua E. Greenspon. Jun 75, 23p Rept no. 0-75-1
Contract N00014-71-C-0115

Descriptors: *Ship hulls, *Acoustic emissions, Bulkheads, Stiffening, Acoustic fields, Mathematical models, Computer programs.
Identifiers: BASIC programming language.

A solution is developed for sound radiation from point loading of an infinite orthotropic plate stiffened by two infinite sets of stiffeners. One set is intended to simulate the intermediate or ring stiffeners of a shell while the other set is intended to simulate the bulkheads. Results emphasize the importance of bulkheads at low frequency, the relative unimportance of rings at low frequency if stiff bulkheads are present and the relative insensitivity of the sound field to both ring and bulkhead stiffness.

AD-A014 125/9CP PC **A05**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
Data Generation for Finite-Element Structural Analysis of Three-Dimensional Naval Ship Structures
Research and development rept.
Paul M. Meyer. Jun 75, 84p Rept no. NSRDC-4637

Descriptors: *Ship hulls, *Computer programs, *Finite element analysis, Structural members, Three dimensional, Structural engineering, Loads(Forces), Data bases, Interactive graphics, Data acquisition, Digital computers, Matrix displays.
Identifiers: *Structural analysis, Data generation, Grillages, IBM 360/91 computers, UNIVAC 1108 computers, CDC 6700 computers, NASTRAN computer program.

A computer program has been developed to automatically discretize three-dimensional structures consisting of combinations of cross-stiffened grillages. Discretizing is dividing a continuous structure into a number of connected parts so that the sum of the collection of parts equals the total structure. The purpose of this computer program is to shorten the preliminary work time involved in preparing data for analysis by the finite-element method. The grillages can have multiple openings with coamings, and the computer program can also generate the cards that describe inplane and normal uniform loads. Input to the program consists of punched cards which define structural geometry, boundary conditions, and loadings. Output consists of a disk file which can be read directly either by NASTRAN or by a special utility program to produce plots of the discretized structure. Access can also be obtained at a later time by a special purpose program which displays the discretized structure at an interactive graphics terminal. The validated data can then be made accessible to NASTRAN for a finite-element analysis. Modifications to this program will extend the current capability of the program for discretizing from simple warped surfaces to more complex curved surfaces and will allow use of the program on either a UNIVAC-1108 or an IBM-360/91 computer. (Author)

AD-A014 328/9CP PC **A02**/MF **A01**
Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Preliminary Report on a Fortran IV Computer Program for the Two-Dimensional Dynamic Behavior of General Ocean Cable Systems
Henry T. Wang. Aug 75, 25p Rept no. SPD-633-01

Descriptors: *Buoys, *Cables, Dynamic response, Ocean waves, Equations of motion, Drag, FORTRAN, Computer programs.
Identifiers: FORTRAN 4 programming language, CABUOY computer program.

The present report describes program CABUOY, which analyzes in some detail the two-dimensional dynamic behavior of general ocean cable systems consisting of a surface buoy, connecting cable, and intermediate bodies. The report briefly presents the calculations which are carried out in the program, gives computer time requirements for several cable cases, and outlines some relatively small additional areas of work. Detailed imput instructions are given in the Appendix.

AD-A015 142/3CP PC **A04**/MF **A01**
Wyle Labs Huntsville Ala
Capsizing/Swamping Accident Investigations for 1974 Season. Volume I. Research Report
Final rept.
C. Sautkulis, M. Knack, and J. Bowman. Apr 75, 56p MSR-75-23, USCG-D-139-75
Contract DOT-CG-40672-A

Descriptors: *Boats, *Accidents, *Safety, Recreation, Casualties, Ship hulls, Structural engineering, Loads(Forces), Stability, Coast Guard.
Identifiers: *Boating accidents, *Recreational boating, *Accident investigations, LODCAP computer program, DOT/5A, DOT/4DZ/DD.

From several hundred boating accidents, twenty (20) were selected from in-depth investigation. Particular emphasis was placed on acquiring adequate data on the physical characteristics of the involved boats for use in the computer program LODCAP which calculates load capacities. The report summarizes the acquisition of the accident data, criteria for selection of those to be investigated, the investigation procedures, and the results of the twenty (20) in-depth investigations.

AD-A015 334/6CP PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
A Computer Program for Plotting the Cellular Structure of Ships
C, V. Smith, and Jackie Potts. Aug 75, 44p Rept no. NSRDC-4648

Descriptors: *Ship hulls, *Compartments, *Computer aided design, FORTRAN, Computer programs, Coordinates, Plotters.
Identifiers: CDC 6700 computers, IBM 360/91 computers.

A computer program, PROPLOT, that produces CALCOMP plotting tapes that are used to display various views of a ship's cellular structure is described. The modeling concept used and a description of the program are presented. Single or multiple CALCOMP plots of a ship's transverse, longitudinal, and plan views may be made. Some possible uses of these plots and the descriptive file that is used to make them are presented. The program can be run on a CDC-6700 or IBM 360/91 computer.

AD-A015 874/1CP PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Comparison of Computer Predicted and Experimentally Determined Leading Edge Cavitation of a Foil with Flaps
Final rept.
Richard M. Norton, and Benjamin B. Wisler. Aug 75, 28p Rept no. SPD-326-06

Descriptors: *Cavitation, *Hydrofoils, *Leading edges, *Flaps(Control surfaces), Model tests, Two dimensional, Three dimensional, Lift, Angles, Drag, Tables(Data), Hydrofoil craft, Computer programs, Mathematical prediction, Experimental data, Accuracy, Comparison.
Identifiers: PCH 1 vessel.

A model test and computer study were compared to assess the ability of a computer program to predict leading-edge cavitation inception. A 1/8 scale model of the PCH-1 forward foil was tested in the high speed towing tank at the David W. Taylor Naval Ship Research and Development Center and assessed by a two-dimensional computer program. Included is the method developed to take into account small flap angles. The results indicate that the two-dimensional program is able to make satisfactory predictions of leading edge cavitation for the PCH-1 foil when invested with three-dimensional values of the lift coefficient and the lift curve slope. (Author)

AD-A015 948/3CP PC **A08**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
An Updated Guide to the Use of General Bending Response Program (GBRP)
Research and development rept.
Michael E. Golden, and Francis M. Henderson. Apr 75, 152p Rept no. NSRDC-4601

Descriptors: *Bending, *Computer programs, *Shafts(Machine elements), Propellers(Marine), Vibration, Structural response, Transients, Ship hulls, Excitation, Damping, Instruction manuals, Subroutines, Overlays, Data management, Input output processing, Torsion, Propulsion system components, Coupling(Interaction), Marine engineering.
Identifiers: General bending response computer program, Propeller shafts.

A new version of General Bending Response Program, a computer program for ship vibration analysis, has been established on the Center's CDC computing system. This version differs from former versions primarily by permitting users to dynamically adjust computer core to fit the needs of any particular application. The report documents the use of the program to: (1) calculate the vibratory forces in a propeller shaft; (2) check the accuracy of normal mode shapes computed with the program's natural frequency option; and (3) obtain SC-4020 plots of computed results. Sample problems demonstrate each of these applications. (Author)

AD-A015 951/7CP PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Comparative Seakeeping Characteristics of Two United States Coast Guard Patrol Boats in Regular Waves
Final rept.
N. K. Bales. Sep 75, 32p Rept no. SPD-635-01

Descriptors: *Patrol craft, *Seakeeping, *Ocean waves, Sea states, Coast Guard, Ship hulls, Response, Comparison, Ship motion, Computer programs, Loads(Forces), Hydrostatic pressure.

The seakeeping characteristics of two, United States Coast Guard patrol boats (a 95-foot WPB and a 140-foot WAGB) are compared. The comparison is based on computer, nondimensional, responses in regular waves. On this basis, the seakeeping characteristics of the 95-foot boat are found to be superior to those of the 140-foot boat. (Author)

AD-A016 813/8CP PC **A04**/MF **A01**
North Carolina State Univ Raleigh Dept of Mechanical and Aerospace Engineering
Extraction of Stability Derivative Values from Test Data Taken on Undersea Vehicles - A Computerized Method
Informal rept.
Frederick O. Smetana, and W. Donald Johnson. Jun 75, 51p NCSL-251-75
Contract N61331-73-C-0049

Descriptors: *Underwater vehicles, *Hydrodynamics, Computerized simulation, Differential equations, Stability, Dynamic tests, Computer programs, FORTRAN, Equations of motion, Convergence.
Identifiers: Newton Rhapson technique.

The modified Newton-Rhapson technique is capable of identifying the stability derivatives (hydrodynamic coefficients) of a vehicle from dynamic flight test data. The technique computes a maximum likelihood estimate of the stability derivatives. This report documents an application of the modified Newton-Rhapson technique to undersea vehicles. To ensure convergence in a small number of iterations, a specialized starting technique is used to develop the initial value estimates of the stability derivatives. For a typical undersea vehicle, examples are provided which illustrate the results of varying the initial starting value and the effects of iteration number on the fit error. A user's guide for the FORTRAN computer program and background information for applying the technique to undersea vehicles are included, together with a general discussion of instrumentation considerations, test and measurement techniques, and piloting techniques for manned vehicles. (Author)

AD-A016 953/2CP PC **A06**/MF **A01**
Massachusetts Inst of Tech Cambridge Dept of Ocean Engineering
A Numerical Method for Two-Dimensional, Cavitating, Lifting Flows
Daniel Wilson Golden. May 75, 102p Rept no. TR-81512-1
Contract N00014-67-A-0204-0083

Descriptors: *Hydrofoils, *Cavitation, Two dimensional flow, Lift, Lifting surfaces, Angle of attack, Boundary value problems, Numerical methods and procedures, Computer programs, FORTRAN.
Identifiers: *Cavitating flow, Lifting flow, FORTRAN 4 programming language.

A numerical method for two-dimensional cavitating flow is developed for the flat plate. The linearized boundary value problem is restated as a set of coupled integral equations. The integral equations are approximated numerically. The numerical approximation is executed by a Fortran 4 computer program. The computed results are compared to the analytic solution. This method should provide insight into developing a method for three-dimensional cavitating flows and is readily extendable to cambered profiles.

AD-A016 969/8CP PC **A08**/MF **A01**
California Univ Berkeley Hydraulic Engineering Lab
Effect of Large Nearshore Structures on Wave Motion in the Vicinity of the Structure and Adjacent Coast
Technical rept.
Volker W. Harms, Ho Tak Sun, R. L. Wiegel, and Manssour A. Kian. Jan 74, 154p Rept no. HEL-1-22
Contract DACW72-72-C-0030

Descriptors: *Structures, *Offshore, *Ocean waves, Littoral drift, Erosion, Diffraction analysis, Breakwaters, Computer programs.
Identifiers: *Offshore structures, *Littoral transport, *Scouring.

This report deals with the diffraction of water waves by large impermeable offshore structures. It presents the first phase of a laboratory study of the diffraction of uniform periodic waves by rigid, impervious, vertical-wall offshore structures. The laboratory tests were evaluated in view of an extension of existing diffraction theory using an available, modified computer program (Fan, Cumming, and Wiegel, 1967). In addition, some studies were made of the effect of wave energy absorbing material placed on the seaward side of laboratory breakwater models.

AD-A017 101/7CP PC **A07**/MF **A01**
Underwriters'Labs Inc Tampa Fla
Investigation of the Performance of Personal Flotation Devices
Final rept.
Aug 75, 129p USCG-D-168-75
Contract DOT-CG-25112-A

Descriptors: *Life jackets, *Floats, *Buoyancy, Human factors engineering, Test methods, Reliability, Safety, Equilibrium(General), Theory, Effectiveness, Coast Guard, Life saving, Life preservers, Anthropometry, Computer programs.
Identifiers: *PFD(Personal Flotation Devices), *Personal flotation devices, DOT/5A, DOT/4ZZ, Recreational boating.

An experimental investigation was performed to study various aspects of an existing theory for flotation equilibrium angle of a person wearing a personal flotation device (PFD) in water. The major objectives were determination of the validity of the theory, and derivation of a method for determining the buoyant force and center of buoyancy of a PFD when worn by a person. Additionally, information was obtained on the sensitivity of the theory to small changes in variables, the variability of repetitive measurements of certain human-body characteristics required by the theory (namely, lung vector and intrinsic stiffness vector), the variation with time of day of an individual's intrinsic stiffness vector, and the comparative effectiveness of five PFD's. The experiments used eight human subjects (130-240 lbs. in weight), five PFD's , and five different times of day. Because of the small number of experiments used, the statistical significance of some results is limited. A recommended approach to evaluating PFD effectiveness using experiments with mannequins is described.

AD-A018 241/0CP PC **A08**/MF **A01**
Pennsylvania State Univ University Park Applied Research Lab
Computer Program Description for Supercavitating Hydrofoil Section Design According to Linearized Theory
Technical memo.
R. F. Davis, and J. Fernanadez. 13 Oct 75, 165p Rept no. TM-75-221
Contract N00017-73-C-1418
See also AD-606 062 and AD-606 038.

Descriptors: *Hydrofoils, *Cavitation, *Computer applications, Structural engineering, Computer programs, Mathematical models, Integral equations, Linear systems, Hydrodynamic configurations.
Identifiers: Computer aided design, *Supercavitating hydrofoils.

A computer program used for calculating section properties of fully cavitating hydrofoils by a linearized Inverse Design method was extensively revamped and made operational on the IBM System 370/168 Computer. The changes to the program are discussed and the complete program is listed.

AD-A018 560/3CP PC **A02**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Results of Exercising a Synthesis Routine for Small Waterplane Area Twin Hull (SWATH) Ships and Comparison with Model Experiments
Final rept.
W. Day, A. Reed, and W. C. Lin. Nov 75, 15p Rept no. SPD-396-19

Descriptors: *Ship hulls, *Computer programs, *Ship models, Mathematical prediction, Marine engineering, Marine propulsion, Moment of inertia, Velocity, Comparison, Computerized simulation, Chebyshev approximations, Horsepower, Ocean waves, Resistance, Experimental data, Synthesis.
Identifiers: SWATH(Small waterplane area twin hulls), Small waterplane area twin hulls, Waterplane coefficients.

A computerized routine for synthesizing a Small Waterplane Area Twin Hull (SWATH) ship has been developed. From simple design parameters a hull can be represented geometrically and resistance and propulsion estimates can be made. The results of a sample exercise of this routine and comparison of model experimental results for SWATH III and SWATH IV are presented. The synthesis routine successfully ranks these two hulls on the basis of propulsive performance. (Author)

AD-A018 568/6CP PC **A19**/MF **A01**
Wyle Labs Huntsville Ala
Capsizing/Swamping Accident Investigations for 1974 Season. Volume II. Appendices B-U
Final rept.
Apr 75, 449p MSR-75-23-Vol-2-App-B-U, USCG-D-140-75
Contract DOT-CG-40672-A
See also Volume 1, AD-A015 142.

Descriptors: *Boats, *Safety, Accidents, Recreation, Casualties, Ship hulls, Standards, Structural engineering, Loads(Forces), Stability, Coast Guard.
Identifiers: *Boating accidents, *Accident investigations, *Recreational boating, LODCAP computer program, DOT/5A, DOT/4DZ/DD.

From several hundred boating accidents, twenty (20) were selected for in-depth investigation. Particular emphasis was placed on acquiring adequate data on the physical characteristics of the involved boats for use in the computer program LODCAP which calculates load capacities. The report summarizes the acquisition of the accident data, criteria for selection of those to be investigated, the investigation procedures, and the results of the twenty (20) in-depth investigations.

AD-A018 789/8CP PC **A09**/MF **A01**
TRW Systems Group Redondo Beach Calif
Submarine Effects Engineering Code. 4. Operating Instructions
Technical rept.
David J. Henryson. 31 Jul 75, 183p Rept no. TRW-20086-6013-RU-00
Contract N00014-72-C-0074, ARPA Order-1910

Descriptors: *Inviscid flow, *Underwater vehicles, *Computer programs, *Internal waves, Coding, Underwater propulsion, Stratification, Flow fields, Propagation, Oceans, Disturbances, Density, Pressure, Inertia, Buoyancy, Submarines, Simulation, Thermoclines, Turbulent flow, Wake, Mixing, Hydrodynamics, Computations, FORTRAN.
Identifiers: *Seek computer program, Stratified flows.

Volumes 1-3 of this series present an analytical description of the inviscid disturbance generated by a submerged moving body in a generally stratified medium. This volume describes the operation of a computer code implementing this analysis, including test cases and code listings. (Author)

AD-A018 914/2CP PC **A08**/MF **A01**
Naval Postgraduate School Monterey Calif
A Computer Model to Assess Financing Provisions of Naval FPIF Shipbuilding Contracts
Master's thesis
Stephen Robert Olson. Sep 75, 152p

Descriptors: *Shipbuilding, *Contracts, *Economic analysis, Procurement, Contract administration, Costs, Forecasting, FORTRAN, Guided missile ships, Frigates, Nuclear powered ships, Aircraft carriers, Theses, Computerized simulation, Mathematical models, Computer programs.
Identifiers: *Fixed price contracts, *Incentive contracts, *Fixed price incentive fee, *Financing, CVN-70 vessel, FFG-7 class vessels.

The complexity of a Fixed Price Incentive Fee (FPIF) contract indicates the need for a quantitative approach in evaluating the impact of FPIF Financing provisions on both the Navy and the contractor. While total program costs may be the most important financial consideration to the Navy, the contractor is affected both by profit and the timing of reimbursement by the government. The timing is an especially important consideration in view of the long construction periods inherent in U.S. Navy ship construction. This paper presents an FPIF contract financing simulation model to evaluate various progress and escalation payment alternatives, progress curves and learning curves. It calculates the impact of cost growth, schedule overrun, and escalation index performance. The model is documented for use by others.

AD-A019 101/5CP PC **A04**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
A Method of Estimating the Sway Force and Rolling Moment on a Submarine Due to Differentially Deflected Sailplanes
Final rept. Jul 74-Jul 75
Keith P. Kerney. Nov 75, 66p Rept no. SPD-632-10

Descriptors: *Submarines, *Deep submergence, *Hydrodynamics, Hydrodynamic control surfaces,

Roll, Moments, Estimates, Computer programs, Computations, Ailerons, Deflection.
Identifiers: Sailplanes(Control surfaces), Sway force.

A method, based on quasi-steady lifting-line theory, has been developed for calculating the sway force and rolling moment acting on a deeply submerged yawed or unyawed submarine due to actuation of sailplanes in the differentially deflected mode. Short digital-computer programs have been written to facilitate quick execution of the calculations. Comparison of calculated and measured sway force and rolling moment shows fairly good agreement.

AD-A020 437/0CP PC **A10**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
Vibratory Response and Acoustical Radiation of a Water-Loaded, Turbulence-Excited Plate-Cavity System--Option 6
Ralph C. Leibowitz. Jul 75, 223p Rept no. DTNSRDC-2976F

Descriptors: *Ship hulls, *Ship plates, *Acoustic emissions, Vibration, Excitation, Acoustic signals, Acoustic fields, Far field, Power spectra, Sound pressure, Computer programs.
Identifiers: *Clamped plates, *Simply supported plates.

This report presents a method and computer program for calculating certain spectral quantities for the vibration as well as the external (half-space) and internal (cavity) acoustic radiation of a plate-cavity system represented as a rectangular parallelepiped. The upper surface of the plate, lying outside of the cavity, is excited by boundary layer turbulence. The lower surface of the plate covers the cavity. The walls of the cavity are either all rigid or uniformly nearly absorbtive, i.e., nearly all rigid. The plate is thin, flat, flexible, isotropic, rectangular, and finite and is either simply supported or clamped-clamped at its boundaries which are contiguous with an infinite, rigid, planar, baffle. The fluid at the boundaries of both sides of the plate, external and internal to the plate cavity system, may consist of any combination of heavy (or dense) and light fluid media. Thus, the plate is acoustically coupled to the external flow field and to the field within the cavity.

AD-A021 832/1CP PC **A11**/MF **A01**
Naval Postgraduate School Monterey Calif
Study of the Roll and Pitch Transients in Calm Water Using the Simulated Performance of the XR-3 Surface Effect Ship Loads and Motions Computer Program
Master's thesis
Reinhard Fritz Menzel. Dec 75, 232p

Descriptors: *Surface effect ships, *Ship motion, *Computer programs, Pitch(Motion), Roll, Dynamic response, Computerized simulation, Theses.
Identifiers: XR-3 vessel.

Comparison studies of simulated performance of two XR-3 Loads and Motions computer programs are made. Computed pitch and roll behaviour in calm water are investigated. Changes in various subroutine programs are made and justified. Finally an optimal model is selected for future studies and validations.

AD-A021 838/8CP PC **A04**/MF **A01**
Naval Coastal Systems Lab Panama City Fla
The Analysis of a Longitudinal Control System for Underwater Vehicles
Informal rept.
Douglas E. Humphreys, Richard W. Miller, and Larry F. Dewberry. Oct 75, 72p Rept no. NCSL-242-75

Descriptors: *Underwater vehicles, *Underwater navigation, *Closed loop systems, Feedback, Control systems, Hydrodynamics, Computer programs.
Identifiers: *Feedback control.

A general longitudinal feedback control system containing pitch, pitch rate, depth, and depth rate feedback is described. The Laplace domain transfer functions for each feedback loop are developed. A computer analysis program using the root locus technique is developed for aiding in the design of the control system. An illustrative example design problem is included.

AD-A022 305/7CP PC **A04**/MF **A01**
Naval Ship Engineering Center Hyattsville Md
Computational Methods in Ship Hydrodynamics
Nathan R. Fuller, Jr. Mar 76, 51p
Presented at the Annual Technical Symposium (13th), Association of Scientists and Engineers of the Naval Air and Sea Systems Commands, 12 Mar 76, Arlington, Va.

Descriptors: *Marine engineering, *Computer aided design, Computer programs, Ship hulls, Performance, Automatic, Digital computers, Manhours, Reduction, Model tests, Interfaces, Maneuverability, Data processing.
Identifiers: Design, IBM 360 computers.

In recent years, research has resulted in the development of analytical ship design techniques which can be of significant assistance to the naval architect. Described herein are several of these techniques and a suggested method for their application to displacement ship hull form development and performance prediction. Utilization of this method once it has been fully developed could result in a significant reduction of man-hours required for a given hull form design. (Author)

AD-A024 667/8CP PC **A13**/MF **A01**
Naval Underwater Systems Center Newport R I
A Study of the Drag Characteristics and Polymer Diffusion in the Boundary Layer of an Axisymmetric Body
Technical rept.
John E. Sirmalis. 12 Mar 76, 277p Rept no. NUSC-TR-4860
Doctoral thesis.

Descriptors: *Drag reduction, *Polymers, *Ejection, *Boundary layer, *Laminar boundary layer, Bodies of revolution, Pipes, Flat plate models, Fluid flow, Axisymmetric, Turbulent flow, Transitions, Turbulent boundary layer, Walls, Diffusion, Concentration(Composition), Test methods, Dyes, Water, Computer programs, Computerized simulation, Mathematical models, Theses.
Identifiers: Polyox WSR-301 polymers.

Drag reduction by ejection of high molecular weight polymers on free-running bodies of revolution has been demonstrated repeatedly. The quantities of polymer required have made the gains achieved marginal from a volume utilization tradeoff. The ejection process is hypothesized to be the controlling factor. Limited data obtained in pipe flow and flat plate flow experiments on ejection into developing boundary layers indicate a drastic reduction in polymer requirements for equivalent percent drag reductions. Extension to axisymmetric flow could result in significant achievable gains to volume utilization. This study examines these polymer ejection processes through measurement of wall and boundary layer concentration profiles and through a photographic study of the boundary layer. Tests performed with fresh water ejection and solutions of the drag reducing polymer, Polyox WSR-301, lead to the hypothesis that optimal ejection for minimum polymer usage requires ejection into a laminar boundary layer prior to turbulent flow transition. Analytical routines are developed which predict boundary layer parameters and polymer wall concentrations for this postulated optimal ejection process or the suboptimal case. Limited verification of the model is made. (Author)

AD-A025 704/8CP PC **A09**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Computation and Mathematics Dept
Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 1
Final rept.
Harry Sheridan, Al Cinque, Jack Lynch, William Hawkins, and Larry Lowe. Jun 75, 199p Rept no. CMD-7-75
Report on the Computer Aided Ship Design and Construction Project. See also Volume 2, AD-A025 705.

Descriptors: *Piping systems, *Computer aided design, *Naval vessels, Ships, Computer programs, Pipes, Construction, Marine engineering, Valves.

This report provides an engineering analysis of the piping process as it applies to the design, planning, and construction of naval ships and presents the results of the analysis in a form which will provide guidance for the development of a computer aided piping design and construction system (CAPDAC). The analysis is documented in 6 volumes.

AD-A025 705/5CP PC **A12**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Computation and Mathematics Dept
Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 2
Final rept.
Harry Sheridan, Al Cinque, Jack Lynch, William Hawkins, and Larry Lowe. Jun 75, 273p Rept no. CMD-8-75
Report on the Computer Aided Ship Design and Construction Project. See also Volume 3, AD-A025 706.

Descriptors: *Piping systems, *Computer aided design, Computer programs, Naval vessels, Ships, Pipes, Marine engineering, Valves, Management engineering, Management planning and control, Construction, Management information systems, Catalogs.

The Navy has begun developing a comprehensive integrated computer aided ship design system, which will incorporate several engineering subsystems.

AD-A025 706/3CP PC **A12**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Computation and Mathematics Dept
Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 3
Final rept.
Harry Sheridan, Al Cinque, Jack Lynch, William Hawkins, and Larry Lowe. Jun 75, 270p Rept no. CMD-9-75
Report on the Computer Aided Ship Design and Construction Project. See also Volume 4, AD-A025 707.

Descriptors: *Piping systems, *Computer aided design, Naval vessels, Ships, Marine engineering, Computer programs, Construction, Manufacturing.

No abstract available.

AD-A025 707/1CP PC **A07**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Computation and Mathematics Dept
Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 4
Final rept.
Harry Sheridan, Al Cinque, Jack Lynch, William Hawkins, and Larry Lowe. Jun 75, 149p Rept no. CMD-10-75
Report on The Computer Aided Ship Design and Construction Project. Includes 2 envelopes containing Figures X-1 and X-2. See also Volume 5, AD-A025 708.

Descriptors: *Piping systems, *Computer aided design, Naval vessels, Computer programs, Flow charting, Ships, Integrated systems, Data processing, Marine engineering.
Identifiers: Computer software.

No abstract available.

AD-A025 708/9CP PC **A17**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Computation and Mathematics Dept
Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 5
Final rept.
Harry Sheridan, Al Cinque, Jack Lynch, William Hawkins, and Larry Lowe. Jun 75, 396p Rept no. CMD-11-75
Report on the Computer Aided Ship Design and Construction Project. See also Volume 6, AD-A025 709.

Descriptors: *Piping systems, *Computer aided design, *Computer programs, Naval vessels, Ships, Pipes, Marine engineering, Management planning and control, Pipe fittings, Pipe bends, Valves, Construction, Quality assurance, Flow charting.

This report provides an engineeering analysis of the piping process as it applies to the design, planning, and construction of naval ships and presents the results of the analysis in a form which will provide guidance for the development of a computer aided piping design and construction system (CAPDAC). The analysis is documented in 6 volumes. This volume discusses implementation of the piping design in the computer based environment described in Volume 3. Functional descriptions of the various application programs and subsystems to be developed are included.

AD-A025 709/7CP PC **A11**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Computation and Mathematics Dept
Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 6
Final rept.
Harry Sheridan, Al Cinque, Jack Lynch, William Hawkins, and Larry Lowe. Jun 75, 246p Rept no. CMD-12-75
Report on the Computer Aided Ship Design and Construction Project. See also Volume 1, AD-A025 704.

Descriptors: *Piping systems, *Computer aided design, *Naval vessels, *Marine engineering, *Computer programs, Pipes, Ships, Construction, Computer applications.

Volume 6 is an appendix to the report and provides lists of drawings, minutes of meetings, information on existing systems and other studies.

AD-A026 397/0CP PC **A06**/MF **A01**
Naval Postgraduate School Monterey Calif
A Study of Pressure-Volume Rates and Plenum Membrane Additions to the Captured Air Bubble Surface Effect Ship XR-3 Digital Computer Loads and Motion Program
Master's thesis
John Martin Boggio. Jun 76, 111p

Descriptors: *Captured air bubble ships, *Surface effect ships, Pressure signatures, Volume, Degrees of freedom, Plenum chambers, Membranes, Models, Computer programs, Theses, Ship motion, FORTRAN.
Identifiers: Pressure volume rates, Plenum membranes, XR-3 vessel, Six degrees of freedom.

A study was conducted of modeling changes to the XR-3 Captured Air Bubble Surface Effect Ship digital computer Loads and Motion program. These changes included the addition of pressure rate and volume rate to the existing 6 degrees of freedom equations. Additional equations were developed to simulate the application of a nonpermeable membrane to the plenum of the XR-3 test craft. The objectives of this study were to determine whether the addition of pressure rate and volume rate equations would improve computer execution time and to test some simplified models of the plenum membrane. Computer timing improvements were demonstrated and membrane modeling results are presented.

AD-A026 865/6CP PC **A04**/MF **A01**
Naval Construction Research Establishment Dunfermline (Scotland)
SPAN: A Computer Program for Static and Dynamic Analysis of Stiffened Plates and Grillages
G. C. Mitchell, J. D. Clarke, and C. S. Smith. Feb 76, 67p NCRE/R630, DRIC-BR-50857

Descriptors: *Grilles, *Ship plates, *Ship structural components, *Computer programs, Plates, Stiffening, Panels, Finite element analysis, Machine coding, Input, Output, Loads(Forces), Response, Frequency, Buckling, Great Britain.
Identifiers: SPAN computer program.

A computer code for the static and dynamic analysis of flat plate grillages is described. The code was a finite element displacement method incorporating a geometric stiffness matrix to calculate the response to static, cyclic or transient loads. Natural frequencies and buckling loads can also be calculated. A full input description is given including a simplified data generation facility for regular grillages. Input and output for some representative sample problems are included. (Author)

AD-A027 862/2CP PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Computation of Loads Acting on the Cross-Structure and Struts of Twin Hull Ships in Beam Waves
Richard M. Curphey. Nov 75, 50p Rept no. SPD-651-01

Descriptors: *Catamarans, *Bending moments, Fortran, Computer programs, Sides, Loads(Forces), Seakeeping, Shear stresses, Two dimensional, Ocean waves, Diffraction, Motion, Hydrodynamics, Mathematical models.
Identifiers: *Beam waves, Swath ships.

This report describes a FORTRAN computer program which provides the transverse bending moment, sideload, and vertical shear force acting on the crossbeam structure and/or struts of twin hull ships in beam waves. The computer program is based upon a two-dimensional potential flow model which includes the effects of the wave diffraction and body motion. Program structure is outlined, and instructions are provided for preparing input data and interpreting output results. (Author)

AD-A029 795/2CP PC **A04**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Computation and Mathematics Dept
LX Synthesis Model Hullform Development - Normalized Bonjean Curves
Final rept.
O. Stephans, and B. Thomson. Jul 76, 68p Rept no. CMD-12-76

Descriptors: *Landing craft, *Ship hulls, *Computer aided design, Computer graphics, Curve fitting, Ballast, Computer programming.
Identifiers: IPAP computer program, Bonjean curves.

The sectional area data of the related hullforms were captured in digital form and processed via an active graphics computer program which displayed the sectional area data and facilitated fitting of least-square polynomial bonjean curves for each offset station. The sectional area data and the derived bonjean curves were transformed to originate at the load waterline and were normalized on the design draft, to promote their use in assessing time and ballast requirements in a synthesis model computer program for wet well-type landing ships.

AD-A029 796/0CP PC **A04**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Computation and Mathematics Dept
Interactive Parameter Analysis Program (IPAP) - User's Manual
Final rept.
E. R. Dixon, B. M. Thomson, and W. F. Starkweather. Jul 76, 57p Rept no. CMD-13-76

Descriptors: *Interactive graphics, *Ship design, *Computer aided design, Computer programs, Programming manuals.
Identifiers: *IPAP computer program.

This manual describes the operation of an interactive graphics computer program which assists ship designers in the identification of correlations and trends in ship design parameters. The program displays points representing parameter values of a selected group of ships, and enables the engineer to fit to these points and record analytic curves.

AD-A030 081/4CP PC **A07**/MF **A01**
Naval Postgraduate School Monterey Calif
Microcomputer Based Pitch and Depth Controller for a Submarine Using Optimal Control Theory
Master's thesis
Heinz-Dieter Dockhorn. Jun 76, 139p

Descriptors: *Submarines, *Control simulators, Microcomputers, Control theory, Equations of motion, Degrees of freedom, Computer programs, Computerized simulation, Mathematical models, Theses.
Identifiers: INTEL-8080 computers, INTELLEC-8 computers, DSL/360 programming language, PLM programming language, Six degrees of freedom.

Microcomputer systems will influence future technical changes in a submarine. As a demonstration of the computational power of the microcomputer, an optimal controller for the pitch and depth of a submarine was developed using the INTEL 8080 microcomputer. A model simulating a submarine and the control algorithm were first written in a simulation language DSL/360. The control algorithm was then coded in the microcomputer language PLM and implemented on a microcomputer. Also included is an investigation of the feasibility to execute the PLM program in a given time frame, an analysis of the computational errors and the inherent errors in measurements from peripheral devices.

AD-A030 090/5CP PC **A04**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Computer Program for Estimation of Extreme Values Based on the Generalized Gamma Distribution
Michel K. Ochi. May 76, 75p Rept no. SPD-692-01

Descriptors: *Statistical functions, *Computer programs, Computations, FORTRAN, Ship motion, Response, Spectrum analysis, Probability density functions.
Identifiers: *Gamma density functions, CDC-6700 computers, Goodness of fit tests, Order statistics.

This report presents a computerized procedure for evaluating the parameters of the generalized gamma distribution from a set of random data following the method proposed by Stacy and Mihram. The computer program includes the estimation of extreme values for a specified number of observations by applying order statistics. Program listings and an example of the application of the method to surface effect ship motion data are included.

AD-A030 530/0CP PC **A04**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Powering Prediction for Various Hybrid Ship Concepts
Gabor Karafiath. Apr 76, 65p Rept no. SPD-675-01

Descriptors: *Ship hulls, *Hydrofoils, *Computer aided design, *Marine propulsion, *Surface effect ships, *Computer programs, Air cushion vehicles, Lift, Drag reduction, Hydrostatic pressure, Resistance, Drag.
Identifiers: *Hybrid ships, *Tribrid ships, Aerostatic lift.

A computer program called TRIBRID is described which can rapidly calculate the smooth water resistances of some advanced hybrid and tribrid ship concepts that are supported by buoyant, dynamic, and aerostatic forces. These forces are produced by one or more hull-strut combinations similar to a demi SWATH in conjunction with large hydrofoils and/or air cushions. For a given displacement and shape, the size of each concept is determined and various drag components along with some interference drag are then calculated for a calm water, fixed zero trim and free to heave operating condition. (Author)

AD-A030 569/8CP PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Computation and Mathematics Dept
Divider Design - An Extension of the Computer Graphics Arrangement Program (COGAP) User's/Systems Manual
Ruey Chen, and Bernard M. Thomson. Aug 76, 44p Rept no. CMD-76-17

Descriptors: *Computer graphics, *Computer aided design, *Bulkheads, *Computer programs, Ship structural components, Shipboard, Data bases, Display systems, Weight, Center of gravity.
Identifiers: User manuals, *COGAP computer program.

A stand alone graphics program was developed through which ship-board arrangement engineers may designate types of structural and non-structural bulkheads, and which will compute and display bulk-head perimeters and will compute, report and store the areas, weights and centers of gravity of non-structural dividers. This program was developed as an adjunct to the Computer Graphics Arrangement Program (COGAP), operating from the same data file as COGAP. The new program, as it currently exists, is not intended for production operation, but rather as a test environment for developing routines to perform the functions noted above and for the requisite extensions to the COGAP data base. (Author)

AD-A030 709/0CP PC **A08**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
A Computer Program for the Preliminary Design of Contrarotating Propellers
Final rept.
E. B. Caster, and T. A. LaFone. Dec 75, 153p Rept no. SPD-596-01

Descriptors: *Propellers(Marine), *Computer programs, *Computer aided design, *Marine propulsion, Hydrodynamics, Propeller blades, FORTRAN, Lift, Pitch(Inclination).
Identifiers: *Contrarotating propellers.

This report presents a new computer program that can be used to design and predict the performance of contrarotating propellers. The new propeller utilizes the latest numerical computation techniques developed for the design of contrarotating propellers. The hydrodynamic pitch angle distribution is specified as input and the design calculations are made using Lerb's moderately loaded single screw lifting line propeller theory. The propeller interaction effects (the most important new feature of the design procedure) are obtained using Kerwin's field point velocity program developed using finite bladed lifting surface theory. An analysis of results obtained for a sample set of contrarotating propellers, designed using the new method presented, show that different design and performance predictions are obtained for the aft propellers when results are compared to those calculated using the old method. Calculations made using the new design method are considered more accurate due to the improved method of determining the propeller interaction effects. A FORTRAN listing of the new propeller, developed to run on the computer at the David W. Taylor Naval Ship Research and Development Center (DTNSRDC) is presented as well as input and output obtained for a sample set of contrarotating propeller designs. (Author)

AD-A030 720/7CP PC **A08**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
A Lifting Line Computer Program for Preliminary Design of Propellers
Final rept.
E. B. Caster, J. A. Diskin, and T. A. LaFone. Nov 75, 156p Rept no. SPD-595-01

Descriptors: *Propellers(Marine), *Computer programs, *Computer aided design, Propeller blades, Power, Skewness, FORTRAN, Digital computers, Hydrodynamics, Mathematical models, Wake, Stresses.
Identifiers: *Lifting line.

This report presents a computer program that can be used for the preliminary design and to predict the performance of single screw propellers when designed for a prescribed hydrodynamic pitch distribution. This design program is based on lifting line theory as developed by Lerbs for moderately-loaded finite-bladed propellers. Stress calculations using beam theory are also made for each design, which take into account the effect of blade skew and rake. Design calculations can be made for given design speeds where delivered shaft power is computed (Thrust Option), or for the case when the delivered shaft power is specified and the corresponding speed is computed (Power Option). A FORTRAN listing of the program, developed to run on the computers at the David W. Taylor Naval Ship Research and Development Center (DTNSRDC), is presented as well as input and output obtained for two sample designs, one using the Thrust Option, and the other the Power Option. (Author)

AD-A031 223/1CP PC **A03**/MF **A01**
California Univ Berkeley Operations Research Center
Shipbuilding Production Function: An Example of a Dynamic Production Function
Research rept.
Ronald W. Shephard, Rokaya A. Al-Ayat, and Robert C. Leachman. Aug 76, 43p Rept no. ORC-76-25
Contract N00014-76-C-0134, Grant NSF-MPS-74-21222

Descriptors: *Shipbuilding, *Industrial production, *Economic analysis, Operations research, Production models, Production engineering, Mapping(Transformations), Computer programs, Network analysis(Management).
Identifiers: Production functions, Load leveling, Dynamic production functions.

The structure of the production function for a shipyard is expressed as a dynamic activity analysis model, with the activities related by a directed graph for transfer of intermediate products. The direct and indirect production correspondences are calculated by solution of a system of recursive relations, and application is made to a specific example with load leveling. (Author)

AD-A031 293/4CP PC **A04**/MF **A01**
Massachusetts Inst of Tech Cambridge Dept of Ocean Engineering
Determination of Damping Coefficients of Swath Catamaran Using Thin Ship Theory
Final rept.
Ki-Han Kim. Jan 75, 70p Rept no. 75-4
Contract N00014-67-A-0204-0023

Descriptors: *Ship motion, *Catamarans, *Heaving, Damping, Mathematical prediction, Pitch(Motion), Coefficients, Boundary layer, Ship models, Mathematical models, Ship hulls, Thinness, Computer programs, Subroutines, Model tests, Experimental data.
Identifiers: Froude number, Thin ship theory, SWATH ships.

This report deals with the problem of pitch and heave damping of a catamaran with small-water-plane-area-twin-hull (SWATH) configuration. A computer program has been developed to compute the pitch and heave damping coefficients of SWATH including forward speed effects based on the thin ship theory developed by Newman (1959). Calculations of the damping coefficients for several Froude numbers are compared with Lee's (1974) experiments. The results show that damping is greatly affected oy the Brard parameter, (omega)(V)/g, when the forward speed effects are considered. The effect of hull distance variation on dampling is also considered. The results show that damping is an oscillatory function of hull distance. The oscillatory phenomenon dies out as the hull distance increases, and also as the Brard parameter increases. (Author)

AD-A031 490/6CP PC **A06**/MF **A01**
Naval Ship Engineering Center Hyattsville Md
Properties of Combined Aluminum Tee Extrusion and Plate
Peter Witherell, and Eugene Aronne. Aug 76, 101p Rept no. NAVSEC-6114-142-76

Descriptors: *Aluminum alloys, *Surface effect ships, *Extrusion, *Plating, Experimental design, Computer programs, Structural engineering, Plates, Stiffening, Lightweight, Space(Room), Stresses, Yield strength, Welding, Tables(Data), Modulus of elasticity, Ship structural components.
Identifiers: Tee fittings, Engineering design, Aluminum alloy 5052, Aluminum alloy 5086, Aluminum alloy 5454, Aluminum alloy 5456, Modulus of elasticity.

The design information contained in this report was developed primarily for use in the SES Design Computer Program of NAVSEC 6114P1. Its publication as a separate report provides ship structural designers with tabulated properties for small non-standard aluminum T extrusions acting in combination with aluminum plate. The T extrusions range from .5 - 9.5 lb/ft and plating is in standard thicknesses from 1/8 in. to 1 in. The extrusions are designed primarily for use as stiffeners in lightweight aluminum structures such as the SES. Since stiffener spacings are typically less than the 35t effective plating width normally used for design in aluminum, the report includes tables for 8 in., 10 in., 12 in., 14 in., and 16 in. effective widths in addition to 35t. Criteria for proportions of the T extrusions are presented in the discussion.

AD-A032 789/0CP PC **A04**/MF **A01**
California Inst of Tech Pasadena Div of Engineering and Applied Science
Non Linear Calculation of Supercavitating Hydrofoils Near a Free Surface
Final rept.
A. J. Acosta, and O. Furuya. Jun 76, 55p Rept no. ENG-193-1
Contract N00014-67-A-0094-0031, N00014-75-C-0430

Descriptors: *Hydrofoils, *Cavitation, *Nonlinear analysis, Fluid dynamics, Surfaces, Computer programs, FORTRAN, Computer printouts.

This report summarizes briefly the research carried out under the Contracts N00014-67-A-0031 and N00014-75-C-0430 on the calculation of supercavitating hydrofoils near a free surface. This work appears in six previous publications. The present report concludes this series of publications with a users list of instructions for the calculation of supercavitating hydrofoils of finite aspect ratio near gravity-free surface. (Author)

AD-A033 339/3CP PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Prediction of Ship Responses in Long-Crested Irregular Waves (Computer Program SRIW)
Final rept.
E. N. Hubble. Oct 76, 27p Rept no. SPD-730-01

Descriptors: *Ship motion, *Ocean waves, Long wavelengths, Predictions, Computer programs, Random variables, Power spectra, Mathematical models.
Identifiers: SRIW computer program.

Current techniques for the prediction of ship motions in long-crested irregular waves are discussed. Format is provided for use of computer program SRIW which applies the method of linear superposition to regular-waves transfer functions obtained from experimental data or analytical predictions. Irregular wave spectra used are 323 point spectra measured at Station India in the North Atlantic and/or a series of mathematical spectra involving six parameters recently developed by Ochi. (Author)

AD-A033 609/9CP PC **A05**/MF **A01**
Coast Guard Research and Development Center Groton Conn
Hydrostatics and Equilibrium Characteristics Computer Program for Recreational Boats
Final rept.
Peter Secrest. Apr 76, 76p CGR/DC-6/76, USCG-D-65-76

Descriptors: *Hydrostatics, *Boats, *Computer programs, Equilibrium(General), Safety, Recreation, Moments, Buoyancy, FORTRAN, Flow charting.
Identifiers: *Recreational boats.

This report is intended to serve as complete documentation of a versatile computer program which calculates hydrostatics and equilibrium characteristics. It differs from other hydrostatics programs in its applicability to odd-shaped boats and in its capability of performing equilibrium calculations. The integration scheme uses trapezoidal rule throughout, allowing random spacing of points and stations defining the hull form. This allows almost every type of hull form to be represented and computations performed. The equilibrium characteristics feature allows determination of transverse and longitudinal righting moment curves, heave restoring forces, trim vs. heel angle coupling, etc. It also is possible to determine the draft, trim and heel for any loading condition Included in the report are a program explanation, user guide, program listings, program flow charts, and a sample run. (Author)

AD-A034 996/9CP PC **A05**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
A Computer Program for Calculation of the Residual Stress Distribution and the Effective Stress-Strain Curve of Cold-Formed Structural Members
Final rept.
Robert K. Tacey. Nov 76, 78p Rept no. DTNSRDC-76-0141

Descriptors: *Structural members, *Residual stress, *Computer programs, Computations, Stress strain relations, Cold working, Cross sections, Compressive properties, Strain hardening, User needs, Inelastic scattering, Bending stress, Tensile properties, Homogeneity, Isotropism, Experimental data.
Identifiers: Bauschinger effect.

This report describes a computer program which can be used to calculate the cross sectional residual stress distribution and the effective compressive stress-strain relationship of a cold formed structural member. The program is user oriented and requires input of only basic geometry and base metal stress-strain data. The program is general as to the shape of the cross section that may be analyzed. It accounts for inelastic material behavior during initial bending and during springback. Strain hardening and unequal compressive and tensile material stress-strain relationships are included in the analysis. Material properties are homogeneous and isotropic within the individual elements. However, they may vary from element to element. The Bauschinger Effect can be accounted for by utilizing non-dimensional experimental data or theoretical formulations. These different methods may be inserted in the program in modular fashion. The program can analyze the forming process as an operation consisting of up to ten individual bends. Graphs are presented that show close agreement between the program predictions and limited experimental results. (Author)

AD-A035 161/9CP PC **A05**/MF **A01**
Defense Systems Management School Fort Belvoir Va
Software Management for Shipboard Computer Systems
Study project rept.
James Kendree Williams. Nov 76, 94p

Descriptors: *Computer program documentation, *Computer programs, Management engineering, Cost estimates, Shipboard, Test and evaluation, Cost analysis, Debugging(Computers), Weapon systems, Costs, Naval vessels, Management planning and control.
Identifiers: *Computer software.

Current software management and software engineering techniques in all phases of embedded computer systems software development are reviewed, especially as related to Navy Ships. Impacts of DODI 5000.29 and recent developments within the Navy regarding software management are discussed, and recommendations are provided for the SHAPM and the acquisition community in general. (Author)

AD-A035 686/5CP PC **A06**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
U. S. Coast Guard Moored Buoy Data Handling and Analysis
Final rept. Dec 72-Jul 75
D. T. Milne, S. K. Hsu, and W. E. Smith. Dec 75, 122p Rept no. SPD-657-01

Descriptors: *Buoys, *Navigational aids, Computer programs, Data acquisition, Motion, Displacement, Statistical analysis, Spectrum analysis, Pitch(Inclination), Roll, Computer applications, Coast Guard.
Identifiers: Moored buoys.

The data handling and analysis of recorded data from a group of independent buoys deployed in the vicinity of the Chesapeake Light Tower is described. Included is a description of the digitization-quality checking progress, the analysis technique used and a discussion on the results. (Author)

AD-A037 063/5CP PC **A02**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
User's Manual for a FORTRAN IV Computer Program for Calculating Propeller/Stern Boundary-Layer Interaction on Axisymmetric Bodies
Final rept.
T. T. Huang. Dec 76, 19p Rept no. SPD-737-02

Descriptors: *Programming manuals, *Boundary layer flow, *Inviscid flow, Numerical methods and procedures, Approximation(Mathematics), Propellers(Marine), Wake, Interactions, FORTRAN, Input output processing, Computer programs.

A computer program which calculates the inviscid approximation of propeller/stern boundary-layer interaction is given. The description includes a summary of the inviscid theory and the assumptions used, an outline of the numerical procedure and computation method, a numerical example, FORTRAN listing, and input and output instructions. This program is designed to compute the effective velocity profile from the measured nominal velocity profile for propeller design. (Author)

AD-A038 061/8CP PC **A11**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Manual for Mono-Hull or Twin-Hull Ship Motion Prediction Computer Program
K. K. McCreight, and C. M. Lee. Jun 76, 239p Rept no. SPD-686-02

Descriptors: *Ship motion, *Computer programs, Programming manuals, Predictions, Ship hulls, Input output processing, Flow charting, Subroutines.

Descriptions of two digital computer programs which calculate the motion of a mono-hull ship or a twin-hull ship are given. The ship is assumed to be advancing at constant speed with arbitrary heading in regular waves. The heave and pitch motion equations are solved in the program MOT35; the sway, roll and yaw motion equations are solved in the program MOT246. Computer input and output and program usage are described. Listings of the program as well as sample input and output are given. (Author)

AD-A038 215/0CP PC **A08**/MF **A01**
Woods Hole Oceanographic Institution Mass
Heave and Roll Response of Free Floating Bodies of Cylindrical Shape
Technical rept.
H. O. Berteaux, R. A. Goldsmith, and W. E. III Schott. Feb 77, 159p Rept no. WHOI-77-12
Contract N00014-75-C-1064

Descriptors: *Hydrodynamics, *Spar buoys, Computer programs, Floating bodies, Cylindrical bodies, Roll, Heaving, Ocean waves, Mathematical prediction, Amplitude, Displacement, Vertical orientation, Computer logic, Harmonic analysis, Drag, Velocity, Response.

The following report describes a computer solution to help predict the heave and roll response of free floating bodies of cylindrical shape when excited by random seas with known spectra. The basic concepts of harmonic analysis and statistics used in the method are first briefly reviewed. The report then presents a detailed derivation of the linear heave and roll response amplitude operators that is the expressions of the vertical and angular displacements produced by a simple harmonic wave of one foot amplitude. The second part of the report reviews the computation procedure and the program's logic. It gives a detailed set of instructions for the program users, reviews the program's capabilities and limitations, and presents three case studies. The heave and roll response programs are written for use with XEROX SIGMA 7 computers. Program listings are given in the appendix. (Author)

AD-A038 248/1CP PC **A13**/MF **A01**
Charles Stark Draper Lab Inc Cambridge Mass
Mooring Mechanics. A Comprehensive Computer Study. Volume II. Three Dimensional Dynamic Analysis of Moored and Drifting Buoy Systems
Final rept.
Narender K. Chhabra. Dec 76, 278p Rept no. R-1066-Vol-2
Contract N00014-75-C-1065

Descriptors: *Buoys, Dynamics, Computerized simulation, Mathematical models, Three dimensional, Mooring, Drift, Oceanographic data, Error analysis, Ocean currents, Surface waves, Drag, Viscous flow, Computer programs.

Ocean currents and surface waves may induce serious errors in oceanographic measurements obtained from moored and drifting buoy systems. A general, computationally efficient solution for the dynamics of moored buoy systems, free drifting buoys, and drogued buoy systems in three-dimensional space is described in this report. Time-domain computer simulations of four specific configurations in various environments are presented. The mathematical model of one of these configurations, a subsurface mooring, was evaluated and improved using full scale ocean test data. The model of the surface mooring configuration studied will soon also be evaluated using recent test data. (Author)

AD-A038 590/6CP PC **A05**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Hydrodynamic Performance of the Model of a Variable Area Waterjet Inlet Designed for a 200 Ton, 100 Knot Hydrofoil Ship
Alan D. Sobolewski. Feb 77, 91p Rept no. SPD-735-01

Descriptors: *Hydraulic jets, *Inlets, *Hydrofoil craft, Hydrodynamics, High velocity, Cavitation, Struts, Hydrofoils, Pressure, Recovery, Performance(Engineering), Computer programs, State of the art, Experimental design, Test methods, Water tunnels, Scale models, Pressure distribution, Drag.

The primary objective of this study was to assess the state-of-the-art in waterjet inlet design capability for high-speed hydrofoil applications. A contract was let for the design of a variable-area, strut-pod inlet for the waterjet propulsion system of a 200 ton, 100 knots hydrofoil ship. A basic requirement of the design was that the inlet must provide cavitation-free operation for prescribed flow-rates at both the 100 knots cruise and 35 knots take-off speed. The most up-to-date design procedures and performance prediction techniques were to be used.

AD-A038 810/8CP PC **A04**/MF **A01**
Naval Postgraduate School Monterey Calif
Microcomputer Application to Compute a Ship's Draft and Longitudinal Stress
Master's thesis
Daniel Samuel Gomez. Mar 77, 54p

Descriptors: *Cargo ships, *Stress analysis, Computer aided design, Load distribution, Problem solving, Microcomputers, Algorithms, Calculators, Shipboard, Tankers, Length, Ship hulls, Depth, Loads(Forces), Computer programs, Tanks(Containers), Capacity(Quantity), Theses.
Identifiers: Basic programming language, Draft(Vessels), AOR 1 class vessels.

The paper introduces an algorithm capable of computing a ship's draft and stress on a small computer system or programmable calculator. The report has also demonstrated how the large amount of data in the ship's capacity tables can be effectively reduced for incorporation into the program. The algorithm was implemented in the BASIC language and was intended to require the minimum of user interaction while providing the maximum useful output. (Author)

AD-A038 811/6CP PC **A05**/MF **A01**
Naval Postgraduate School Monterey Calif
A Shipboard Report Origination System Utilizing a Microcomputer
Master's thesis
Joseph Glade Holyoak. Dec 76, 80p

Descriptors: *Microcomputers, *Management information systems, Reports, Editing, Shipboard, Error analysis, Disks, Memory devices, Computer programs, Theses.
Identifiers: Report generators, Interactive systems, Report origination systems.

A Report Origination Systems (ROS) has been implemented, using an inexpensive microcomputer system, to help ease the administrative burden facing Navy shipboard managers. The system is an interactive line editing system, with optional prompting, which enables a person who is unfamiliar with the report format to respond to queries in order to edit a highly formatted report. Automatic error checking is performed using a previous edition of the report as a basis. The system allows creation of new formatted reports. The use of a general purpose microcomputer system makes the editing system affordable to a large number of users and also provides a general computing facility for other uses. (Author)

AD-A039 491/6CP PC **A04**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Computation of the Velocity Potential for a Pulsating Source in a Fluid with Free Surface and Finite Depth
Final rept.
D. J. Sheridan. Dec 75, 53p Rept no. SPD-652-01

Descriptors: *Hydrodynamics, *Fluid flow, *Ship motion, Potential theory, Pulses, Sources, Frequency, Surfaces, Depth, Numerical analysis, Computer programs.
Identifiers: Forcing functions.

A technique is presented that allows the numerical evaluation of the velocity potential for a pulsating source in a fluid with a free surface and finite depth. The series expansion used to obtain a numerically tractable representation of the finite depth potential is in a form suitable for use with ship motion programs that employ source distribution techniques in conjunction with strip theory. The effects of water depth, source submergence, and pulsating frequency on the free-surface elevation are explored with the intent of demonstrating finite depth effects on readily identifiable physical parameter. (Author)

AD-A039 510/3CP PC **A08**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
Structural Seaworthiness Digital Computer Program ROSAS (A Conversion from Seaworthiness Analog Computer)
Research and development rept.
Sheng-Lun Chuang, Erwin A. Schroeder, and Suzanne Wybraniec. May 77, 153p Rept no. DTNSRDC-77-0001

Descriptors: *Ship motion, *Computer programs, Seaworthiness, Structural response, Ship hulls, Buoyancy, FORTRAN.
Identifiers: ROSAS computer program.

The structural seaworthiness digital computer program ROSAS and users manual are presented in this report. The program was developed using FORTRAN computer language, and it simulates the hull girder structural response of a ship, including dynamic effects when it encounters head seas of the regular, irregular, discrete, standing or other wave forms. Response calculations include the ship rigid and elastic body motion, bending moment, and shear. Vibratory hull girder modes can also be determined, and the effect of bow flare, bottom slamming and springing can be included. Computations have been compared with actual ship responses. The results are in good agreement with those obtained from actual ship sea trials, model experiments, a computer program developed by the Ship Structure Committee, and an earlier analog computer program developed by the David W. Taylor Naval Ship Research and Development Center. The program is a valuable tool for predicting hull girder response of new ship designs or to compare results of model or prototype data. (Author)

AD-A039 620/0CP PC **A04**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Ship Response Time History Predictions for a Conventional Preliminary CSGN Design
L. E. Motter, and T. R. Applebee. Apr 77, 55p Rept no. SPD-724-07

Descriptors: *Ship motion, *Cruisers, *Guided missile ships, Center of gravity, Seaworthiness, Nuclear propulsion, Computer programs, Mathematical prediction, Probability density functions, Sea states, Ocean waves, Velocity, Acceleration, Response, Time series analysis.
Identifiers: *CSGN class vessels.

The motion, velocity, and acceleration responses at ship center of gravity (CG) in long-crested seas were predicted for a preliminary conventional hull design of a new class of nuclear-powered, guided-missile strike cruiser. Time histories from the computer predictions are stored on computer permanent files for easy access and future use. Recently developed techniques for determining ship response time histories at various locations other than the ship CG and in short-crested seas were used to calculate sample time histories of important ship responses. A computer program was developed to read the predicted time histories and compute probabilities that specified motion response limits would be exceeded for various time periods. (Author)

AD-A040 311/3CP PC **A04**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Design of the Stern Control Surfaces and Prediction of the Motions of the Dolly Varden Buoyant Rise Test Vehicle
Richard M. Curphey. May 77, 60p Rept no. SPD-770-01

Descriptors: *Control surfaces, *Research ships, Motion, Vertical orientation, Predictions, Buoyancy, Test vehicles, Dynamic tests, Stability, Computer programs, Trajectories, Underwater acoustics, Attitude control systems, Horizontal orientation, Displacement, Recovery, Deflection.
Identifiers: Dolly Varden test vehicle.

The stern control surfaces of a 60-foot version of the DOLLY VARDEN Buoyant Rise Test Vehicle were designed from the standpoint of dynamic stability in vertical flight. Computer predictions were made of the vertical flight trajectories of the vehicle. It was found that a cruciform configuration of all-movable, rectangular stern appendages with tip to tip span of 10 feet and chord length of 5 feet will provide adequate stability in vertical buoyant rise flight and required maneuverability for recovery. It was also determined that a net buoyancy of 20000 pounds would provide the required operational speed. (Author)

AD-A040 713/0CP PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Calculation of Streamlines on the USNS DUTTON
Final rept.
H. T. Wang, C. W. Dawson, and N. M. White.
May 77, 26p Rept no. SPD-771-01

Descriptors: *Flow streamline, *Ship hulls, Computer programs, Potential flow, Two dimensional flow, Three dimensional flow, Sonar domes, Ship keels, Air bubbles, Entrainment, Surface ships, Oceanographic ships, Hydrographic surveying, Sonar receivers.
Identifiers: AGS 22 vessel, Free surface effects, Bow waves, XYZ computer program, Froude number.

Four computer calculations were made of the paths of streamlines on the hull of the USNS DUTTON, with and without a proposed keel sonar dome located on the ship's forebody. The calculations employed a potential flow computer program in which the free surface must be treated as a plane of symmetry, and a newer version of this program which can account for free-surface effects. Numerous computer-generated figures of the ship lines and streamlines are presented. The results briefly discussed. The calculations show that the streamlines which pass through the region of a keel-mounted acoustic receiver array located near amidships get no closer than six or seven feet to the ocean surface. Thus, air bubbles originating in the stem or bow region should not be swept past the receiver array by the streamlines and should not degrade receiver acoustic performance. (Author)

AD-A041 797/2CP MF **A01**
Naval Ship Research and Development Center Bethesda Md Applied Mathematics Lab
Ship Propulsion Shafting Bearing Reaction Programs MGE2 and MGE5 for IBM 7090 (with notes on Univac LARC)
Technical note
Sharon E. Good. Aug 67, 108p Rept no. AML-70-67
Availability: Microfiche copies only.

Descriptors: *Shafts(Machine elements), *Propellers(Marine), *Computer programs, Propulsion system components, Bearings, Shear properties, Bending moments, Deflection, Stiffness, Weight, Fortran, Mechanical properties.
Identifiers: FORTRAN 4 programming language, MGE2 computer program, MGE5 computer program, IBM 7090 computers.

MGE2 is a FORTRAN IV program which computes characteristics of the main propulsion shaft of a ship, assuming that all bearing centers are on a straight line. Output from this program consists of the straight-line bearing reactions and the influence numbers for each support point. These influence numbers indicate the changes in supporting reactions produced by the raising or lowering of a particular bearing. The program also calculates the shear, bending moment, slope, and deflection values, and the weight and stiffness factors for stations designated along the shaft. MGE5 is a program similar to MGE2. It is a design tool for determining the effects of bearing centers at any given elevation relative to the straight line. MGE5 is often used after MGE2 to determine the reactions of realigned bearings. Output from MGE5 includes bearing reactions at each support point and shear, bending moment, and slope and deflections values at designated stations. (Author)

AD-A042 176/8CP MF **A01**
Naval Postgraduate School Monterey Calif
Sensitivity Study of the XR-3 Loads and Motions Computer Program Sidewall Parameters and Forces on Roll Behavior in Calm Sea and a Comparison to Testcraft Turn Maneuver Data
Master's thesis
Rolf-Guenther Riedel. Jun 77, 210p
Availability: Microfiche copies only.

Descriptors: *Surface effect ships, *Computerized simulation, Computer programs, Ship motion, Roll, Maneuverability, Force(Mechanics), Moments, Loads(Forces), Theses.
Identifiers: XR-3 vessel, Turning maneuvers.

The sensitivity of the XR-3 roll behavior in calm sea on sidewall parameters and force and moment calculations is investigated with the Loads and Motions computer program and compared with experimentally measured data. Propulsion and rudder subroutines and added mass computation are reviewed and modified. Recommendations for improved simulation of the XR-3 roll behavior are given. (Author)

AD-A042 563/7CP PC **A04**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
Theoretical Prediction of Dynamic Wave Loads on Small-Waterplane-Area, Twin-Hull Ships
Research and development rept.
R. M. Curphey, and C. M. Lee. Jul 77, 53p Rept no. DTNSRDC-77-0061

Descriptors: *Ship hulls, *Dynamic loads, Hydrodynamic configurations, Ship motion, Water waves, Shear stresses, Vertical orientation, Bending moments, Mathematical prediction, Computerized simulation, Computer programs.
Identifiers: Swath ships.

A mathematical model and computer program have recently been developed to predict the bending moment, sideload, and vertical shear force acting on the cross structure and strut of twin-hull ships in beam waves. The computer program has been used to predict these loads for a variety of small .waterplane-area, twin-hull (SWATH) ships, and good agreement with experimental data confirms the basic validity of the prediction technique. The prominent feature of sideload and transverse bending-moment responses for SWATH ships is a sharp peak resulting from wave diffraction at an excitation wavelength roughly three to four times the maximum overall beam of the ship. (Author)

AD-A043 174/2CP PC **A07**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Computation Mathematics/Logistics Dept
Assessment of Ship Dynamics Programs for Possible Integration into the Integrated Ship Design System
R. Cross, and B. Thomson. Apr 76, 134p Rept no. CMD-76-22

Descriptors: *Ship hulls, *Computer aided design, *Ship design, Ship decks, Ship motion, Integrated systems, Computer programs, Slamming, Wetting, Hydrofoils, Surface effect ships, Air cushion vehicles, Planing surfaces, Catamarans, Maneuverability, Resistance, Computer programs.
Identifiers: *Ship dynamics, Integrated ship design systems.

The Integrated Ship Design System (ISDS), is in development to permit preliminary ship design to be accomplished using interactive computing. Currently ISDS does not address ship dynamics and this report explores programs in this discipline for inclusion in ISDS. A literature search was performed to identify, classify, and tabulate computer programs involving ship dynamics. The search included programs addressing motion prediction, added resistance in waves, slamming, deck wetness, and maneuvering for displacement hulls, hydrofoils, surface effect ships, air cushion vehicles, planing hulls, and catamarans. Candidate programs were analyzed with respect to their input data requirements and the relationship of these requirements to the flow of data among existing design programs of the Integrated Ship Design System (ISDS), and two dynamics programs for displacement hulls are recommended for integration into ISDS. (Author)

AD-A044 220/2CP PC **A06**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda MD Ship Performance Dept
Hullborne Hydrofoil Six-Degree of Freedom Motion Prediction Computer Program
Final rept.
R. Stahl, and E. E. Zarnick. Jul 76, 125p Rept no. SPD-713-01

Descriptors: *Hydrofoil craft, *Ship motion, *Computer programs, Predictions, Hulls(Marine), Degrees of freedom, Constants, Velocity, Water waves, Struts, Mathematical models, Computerized simulation, Equations of motion, Moments, Force(Mechanics), Model tests.
Identifiers: Six degrees of freedom.

A description of a motion prediction computer program for a hullborne hydrofoil is presented. This program computes the six-degree-of-freedom (6DOF) hydrofoil craft motions for a craft advancing at a constant forward speed, less than the critical 'lift-off' speed, with arbitrary heading in regular waves. The structure of the program consists essentially of the already existing 'DTNSRDC Ship-Motion and Sea-Load Computer Program' modified to incorporate the foil and strut system of a hydrofoil craft. Presented in this report is a brief discussion of the mathematical model, input information pertaining to the hydrofoil and a discussion of the results. The Appendicies present a listing of the foil coefficients, data card format description for the original program, and a program listing. (Authro)

AD-A044 325/9CP MF **A01**
Naval Postgraduate School Monterey Calif
Investigation of a Linear, Two-Degree-of-Freedom Simulation of the XR-3 Captured Air Bubble (CAB) Craft in the Frequency Domain
Master's thesis
Lewis Frank McIntyre. Jun 77, 186p
Availability: Microfiche copies only.

Descriptors: *Captive airspace craft, *Computerized simulation, Frequency response, Ship motion, Pitch(Motion), Heaving, Degrees of Freedom, Linear systems, Fast fourier transforms, Habitability, Seaworthiness, Sea states, Frequency response, Moments, Damping, Computer programs, Theses.
Identifiers: XR-3 Vessel, *Captive air bubble vessels.

A simplified two-degree-of-freedom simulation in heave and pitch of the XR-3 Captured Air Bubble (CAB) testcraft is developed first in a non-linear form and is subsequently linearized about the steady-state operating point. The model is validated against the six-degree-of-freedom XR-3 Loads and Motions program in the time domain; the linear system is then transformed into the frequency domain by complex matrix inversion. A comparison is made between the linear system frequency response predicted by the two-degree-of-freedom model and that of the Loads and Motions program, as well as actual testcraft data, reduced to the frequency domain by a Fast Fourier Transform (FFT) technique. This comparison of frequency response curves highlights a non-linear mode of CAB craft behavior of possible interest to habitability and seaworthiness studies. (Author)

AD-A045 173/2CP PC **A03**/MF **A01**
Naval Postgraduate School Monterey Calif
Simulation of a Controllable Reversible Pitch (C.R.P.) Propeller System
Master's thesis
Masaaki Kanazawa. Jun 77, 44p

Descriptors: *Variable pitch propellers, *Digital simulation, *Hydraulic servomechanisms, Propellers(Marine), Reversible, Control systems, Servovalves, Thrust reversal, Dynamic loads, Computer aided design, Connecting rods, Pistons, Displacement, Velocity, Fluid control, Hydraulic power, Damping, Simulation languages, Simultaneous equations, Differential equations, Computer programs, Theses.
Identifiers: Design, CRP propellers.

A computer model was developed to simulate a C.R.P. propeller system. A set of simultaneous differential equations was solved using CSMP III-the IBM simulation language. The computer model was verified against manufacturer's data. Power piston displacement, power piston velocity and chamber pressure were determined for a nominal supply pressure of 600 PSI and various loadings. Overall, the system model and data should prove useful for investigations of design variations. (Author)

AD-A045 443/9CP PC **A05**/MF **A01**
Center for Naval Analyses Arlington Va Systems Evaluation Group
A Methodology for Quantifying the Operational Effects of Ship Seakeeping Characteristics
Stephen R. Olson. Feb 77, 100p Rept no. CRC-333
Contract N00014-76-C-0001

Descriptors: *Seakeeping, *Computer programs, *Ship motion, Digital simulation, Ocean waves, Slamming, Height, Sea states, Ocean models, Motion sickness, Frigates, Guided missile ships, Flight decks, Sonar domes, Ship hulls, Computer program documentation, Ship design, FORTRAN.
Identifiers: FFG 7 vessel, SEAMON computer program, CDC-3800 computers.

This paper presents a methodology for quantifying the operational effects of the seakeeping characteristics of ships and documents the computer program developed for this purpose. Potential modifications that can be applied to the program are also discussed. (Author)

AD-A046 266/3CP PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
A Computer Program for Structural Response to Ship Slamming (SLAM)
Gary P. Antonides. Jul 75, 46p Rept no. DTNSRDC-4480

Descriptors: *Ship hulls, *Structural response, *Computer programs, Slamming, Resonant frequency, Impact shock, Vibration, Beams(Structural), Girders, System test vessels, Subroutines, Computerized simulation, Finite element analysis, Equations of motion, Orthogonality, Flow charting.
Identifiers: *Slam computer program, AG 153 class vessels.

This report describes a computer program, SLAM, which uses ship slamming-impact forces and structural parameters of the hull to calculate the vertical hull-girder vibratory response in terms of displacements, accelerations, bending moments, shear forces, and stresses. The normal mode method is used so that the user can calculate only the modes of interest and can eliminate the rigid body and higher modes. Modal responses are calculated with a time-marching technique. The program uses a finite-element model of a beam which is suitable for conventional monohulls. Modifications to accommodate other model configurations can be made. Test problems show good agreement with exact solutions for a uniform Euler beam. Sample calculations are made on a MARINER-Class hull using 3 modes and again using 10 modes. (Author)

AD-A046 508/8CP PC **A04**/MF **A01**
Naval Postgraduate School Monterey Calif
An Analysis of the Ships Parts Control Center Inventory Model and a Possible Alternative Model
Master's thesis
Keith Wayne Lippert. Jun 77, 75p

Descriptors: *Inventory control, *Spare parts, *Ships, Inventory analysis, Mathematical models, Cost effectiveness, Decision making, Logistics support, Optimization, Statistical analysis, Computer programs, Theses.

The inventory model implemented is a sophisticated, stationary, continuous-review, constrained reorder-level, reorder-quantity model. In accordance with DOD Instruction 4140.39, the goal of this model is to minimize the total of variable inventory order and holding costs subject to a constraint on time-weighted, essentiality-weighted requisitions short. SPCC attempts to accomplish this goal by using various probability distributions to estimate demand during leadtime. The purpose of this thesis is to examine this existing model, to discuss the validity of its underlying assumptions when applied to a military supply system, to offer a possible alternative model using distribution free assumptions, and finally to evaluate the models.

AD-A046 534/4CP PC **A04**/MF **A01**
Pennsylvania State Univ University Park Applied Research Lab
Design Implementation for Supercavitating Hydrofoils with Two-Point Cavity Thickness Control
Technical memo.
J. Fernandez. 16 Jul 77, 73p Rept no. TM-77-199
Contract N00017-73-C-1418

Descriptors: *Hydrofoils, Hydrodynamics, Mathematical models, Computer aided design, Cavitation, Fluid flow, Pressure distribution, Computer programs, Numerical analysis, Equations, Cavities, Surfaces.
Identifiers: Supercavitation.

A computer aided inverse design method for supercavitating hydrofoils was given recently by Parkin and Fernandez. This method uses a linearized cavity flow theory to determine the wetted surface shape from a prescribed pressure distribution and to evaluate its overall performance parameters, while controlling the cavity thicknesses at two points along the chord. The numerical analysis for this design method is discussed in this report and the computer program is listed. (Author)

AD-A046 877/7CP PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Ship Motion and Flexure Data Base for the CG-26
Harry D. Jones, and William R. McCreight. Nov 77, 39p Rept no. SPD-798-01

Descriptors: *Ship motion, *Flexural properties, *Ship hulls, Data bases, Flexing, Ship design, Time domain, Frequency, Angular motion, Sea states, Orientation(Direction), Guided missile ships, Cruisers, Transfer functions, Computer programs, Utilization.
Identifiers: CG 26 vessel, CDC-6700 computers.

A generalized ship motion and hull flexure data base applicable to the CG-26 was developed. This data base is stored on CDC 6700 computer disk packs. This data base consists of both an extensive frequency domain data base and an extensive time domain data base of the rigid body motions and the angular hull deflections. The conditions represented in the data base include a range of ship speeds and sea conditions at headings from head to following seas. Also included are the necessary computer programs to access and manipulate the data as required.

AD-A047 021/1CP PC **A02**/MF **A01**
Naval Construction Research Establishment Dunfermline (Scotland)
SPAN: User's Summary. Addendum
G. C. Mitchell. Mar 77, 25 NCRE/R630-ADD, DRIC-BR-57609
Addendum to report dated Feb 76, AD-A026 865.

Descriptors: *Grilles, *Ship plates, *Ship structural components, *Computer programs, *Static loads, *Dynamic loads, Structural analysis, Deflection, Finite element analysis, Beams(Structural), Plates, Great Britain, Stiffening, Buckling, Fortran, Input, Formats, User needs.
Identifiers: SPAN computer program.

'SPAN' is a computer program for static and dynamic analysis of stiffened plates and grillages. This addendum contains a precis of R630, plus additional information on computing times, control-cards and permissible problem size. It may be regarded as superseding that document for the conversant SPAN user.

AD-A047 165/6CP PC **A06**/MF **A01**
Naval Postgraduate School Monterey Calif
A Vessel Inspection Information System
Master's thesis
Larry Mark Wilson. Sep 77, 107p

Descriptors: *Information retrieval, *Merchant vessels, *Inspection, Safety, Data bases, Coast Guard, User needs, Information systems, Computer applications, Transmission lines, Communications networks, Cost estimates, Computer programs, Theses.
Identifiers: Vessel Inspection Information System.

Marine safety is a major responsibility of the United States Coast Guard. In carrying out this task, the Coast Guard conducts periodic inspections of existing merchant vessels and supervises construction of new vessels. To support and help promote marine safety, a Vessel Inspection Information System (VIIS) has been proposed. The system would be used to capture design information, inspection data, and other relevant information; store it in a centralized data base; and make the information available to Coast Guard Units as needed through the use of interactive computer terminals. The purpose of this thesis is to present the results of a computer program which provides cost estimates of the communications networks in VIIS and provides information on network performance. (Author)

AD-A047 565/7CP PC **A06**/MF **A01**
Pennsylvania State Univ University Park Applied Research Lab
Propeller-Hub Interference Effects Using an Approximate Lifting Surface Theory
Technical memo.
Karl Ludolph. 15 Jun 77, 104p Rept no. TM-77-198
Contract N00017-43-C-1418
Master's thesis.

Descriptors: *Propellers(Marine), *Propeller hubs, Interference, Aspect ratio, Mathematical models, Wake, Drag, Velocity, Computer programs, Problem solving, Computerized simulation, Lifting surfaces, Propeller blades, Optimization, Airfoils, Trailing vortices.
Identifiers: Lifting surface theory.

In order to provide for a more exact model of a marine propeller with a hub and yet avoid the complex computations necessary in an exact theory, an approximate lifting-surface theory was developed. The approximation fundamental to this development is that of Weissinger's, where an airfoil is replaced with a single bound vortex and its associated trailing vortex system at the 1/4 chord point, while the boundary conditions are satisfied only at the 3/4 chord point. The life coefficient obtained in this manner will approximate the results of thin airfoil and be exactly the same for the cases of circular arc and flat plate airfoils. This theory was subsequently used to find the induced normal velocity on the surface of a propeller's hub. The hub was broken up into a series of frustrums and the average induced velocity was found on an arc of the frustrum between two successive blades. This velocity was assumed constant over the entire frustrum. The induced normal velocity at each section of the hub was then incorporated into the A. M. O. Smith, and J. Pierce solution of the potential flow around an arbitrary body. Once this source distribution was found for uniform onset flow around the body and hub, the distribution was used along with the approximate lifting-surface theory to find the ideal lift coefficient, ideal angle of attack, and the maximum camber of the propeller section. Three computer programs were written to apply this theory to an actual propeller and HUB.

AD-A047 786/9CP PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
Depot Maintenance SWBS System Initial Data Base
Final rept. Jan 77-Jul 77
Paul Hubai. Dec 77, 28p Rept no. DTNSRDC-77-0114

Descriptors: *Ships, *Maintenance, *Depots, *Shipyards, Data bases, Naval vessels, Repair, Requirements, Manpower, Materials, Computer programs, Data processing.
Identifiers: Depot maintenance SWBS system, Ship work breakdown structure.

The Depot Maintenance SWBS System (DMSS) is a means of projecting shipyard requirements for manpower and material by Ship Work Breakdown Structure (SWBS). Development of DMSS included the development of computer programs and the associated data bases. This report presents the results of the effort to develop the initial DMSS data base. (Author)

AD-A048 162/2CP MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
Structural Synthesis Design Program
Research and development rept.
Ronald W. Walz, Frank M. Lev, and Natale S. Nappi. Dec 77, 176p Rept no. DTNSRDC-77-0032
Availability: Microfiche copies only.

Descriptors: *Ship design, *Ship structural components, *Computer aided design, Ship hulls, Girders, Ship keels, Ship decks, Bulkheads, Steel, Aluminum alloys, Beams(Structural), Computer programs, Stress analysis, Cross sections, Lightweight, Optimization, Military requirements, Weight reduction, Loads(Forces), Strength(Mechanics).
Identifiers: MIDSHIP section design, Structural synthesis design program.

The Structural Synthesis Design Program (ssdp) is an extension of the original MIDSHIP section program developed at this Center. SSDP may be used to design the longitudinal scantlings for a variety of ship cross sections, consisting of any practical combinations of decks, platforms, bulkheads, and materials--steels and/or aluminum. The final section design will have the lowest practical weight for the chosen geometric configuration and imposed loadings. The scantlings it develops will comply with design criteria defined by current U. S. Navy design practices. An additional feature of SSDP is that the program can also be used to perform a design validation of proposed section design. The input data required for operating the program are no more comprehensive than those normally assembled to develop an efficient design of a cross section by manual methods. Four demonstration problems are provided to aid the program user in preparing input data. These examples are of no specific existing ship type but are idealized examples intended to illustrate the design capabilities of the program.

AD-A048 227/3CP PC **A06**/MF **A01**
General Dynamics Corp Groton Conn Electric Boat Div

Analytic Modeling of Heat Flow and Structural Distortion in Ship Structures Produced by Welding
Technical rept. no. 1, Jul 76-Jul 77
P. J. Cacciatore. Oct 77, 121p Rept no. U443-77-085
Contract N00014-76-C-0808

Descriptors: *Welding, *Heat transmission, *Distortion, *Ship structural components, Computer programs, Computerized simulation, Structural analysis, Steel, Ship plates, Deformation, Experimental data, Comparison.

This report describes the results of an investigation of the welding analysis capabilities of available computer programs. Analysis programs currently available at Electric Boat Division are also reviewed and compared with the programs developed at MIT. These programs are utilized in the welding analysis of a double-vee grooved unrestrained steel plate. Comparison of calculated transient temperatures and distortions with experimental data are made. (Author)

AD-A048 465/9CP PC **A04**/MF **A01**
Dynamics Technology Inc Torrance Calif
An Analytical Study of the Effect of Surface Roughness on Boundary-Layer Stability
Final rept. 29 Nov 76-30 Sep 77
Charles L. Merkle, Kent T. S. Tzou, and Toshi Kubota. Oct 77, 69p Rept no. DT-7606-4
Contract N00014-77-C-0005

Descriptors: *Boundary layer flow, *Surface roughness, *Underwater vehicles, Hydrodynamic control surfaces, Boundary layer control, Stability, Reynolds number, Transitions, Heat transfer, Hydrodynamic codes, Suction, Cylinders, Prandtl number, Computer programs, FORTRAN, Mathematical models, Computerized simulation.
Identifiers: TAPS Computer Program.

The effects of surface roughness on the transition of a laminar boundary layer are basically two-fold: (1) it can distort the mean velocity and temperature profiles thus altering the stability characteristics of the layer and (2) it can induce additional disturbances to the boundary layer which may lead to an earlier transition. Only the first of these effects is considered in this report. Three different types of surface roughness are investigated here; distributed roughness, surface waviness, and a single two-dimensional bump. An analytical model which describes the effect of distributed roughness on the mean flow and its stability is described. This model is further validated by comparison with Achenbach's experimental results and is then applied to the flow about an underwater body in order to illustrate the effects of surface roughness in a more realistic situation. Surface irregularities can play a dominant role in determining the practical limit for the application of boundary-layer control techniques. The present distributed roughness model as incorporated into the TAPS code can provide a reasonable prediction of its effect in the presence of boundary-layer control techniques (shaping, heating, suction) on the transition location for an underwater vehicle.

AD-A048 783/5CP PC **A07**/MF **A01**
Naval Postgraduate School Monterey Calif
A Feasibility Study of Heat Transfer Improvement in Marine Steam Condensers
Master's thesis
Harry Thomas Search. Dec 77, 129p Rept no. NPS-69-77-001

Descriptors: *Steam condensers, *Heat transfer, *Aircraft carriers, Feasibility studies, Film cooling, Computer programs, Marine engineering, Weight, Cost effectiveness, Theses.
Identifiers: CVA-67 vessel, ORCON 1 computer program.

A survey of condenser design principles and heat transfer augmentation schemes is provided. Using the ORCON 1 computer code, as developed by Oak Ridge National Laboratory, a thermal analysis was performed on the main condenser of the USS John F. Kennedy, CVA-67. A comparison was made between the standard design and fifteen test cases where heat transfer was improved using a variety of techniques, including internally finned tubing, corrugated tubing, promotion of dropwise condensation, and use of thin-walled titanium tubing at high sea water velocities. Each case was compared for heat load capability at constant pumping power, and for weight, volume, and estimated cost at an equivalent heat load. Results show that with the present condenser volume, the heat load can be increased by as much as 50 percent using heat transfer improvement techniques. From a different point of view, at the same heat load, a 40 percent reduction in condenser weight and volume may be feasible. Several of the proposed heat transfer improvement schemes may lead, however, to increased pumping power and/ or cost. Continued research is recommended in several promising areas to provide more adequate design information and to improve the long term reliability of these proposed schemes. (Author)

AD-A049 953/3CP PC **A08**/MF **A01**
Naval Postgraduate School Monterey Calif
Marine Steam Condenser Design Using Numerical Optimization
Master's thesis
Charles Michael Johnson. Dec 77, 164p Rept no. NPS-69-77-002

Descriptors: *Steam condensers, *Marine surface propulsion, *Ship design, Computer aided design, Computer programs, Computer program verification, Digital computers, Aircraft carriers, Destroyer escorts, Numerical analysis, Optimization, Marine engineering, Theses.
Identifiers: OPCODE1 computer program, OPCODE2 computer program.

Two separate computer codes were coupled with a constrained function minimization code to produce automated marine condenser design and optimization programs of vastly different complexity. The first program, OPCODE1, was developed from the Heat Exchange Institute's Standards for Steam Surface Condensers (HEI). The second program, OPCODE2, was developed from the sophisticated ORCON1, a computer code produced by the Oak Ridge National Laboratory. CONMIN, the optimization program, was developed at the Ames Research Center. OPCODE1 was well verified using main condenser input data of an aircraft carrier and a destroyer escort. Verification of OPCODE2, using main condenser data of an aircraft carrier, was less satisfactory due to the conservative nature of flooding effects on the outside film heat transfer coefficient used in ORCON1. OPCODE1 is an excellent design tool for the conceptual design of a marine condenser. Optimized test cases run with OPCODE1 show that a condenser designed by the HEI method is nearly optimum with respect to volume. Test cases with OPCODE2 show that enhancing the heat transfer on the shell-side by 80 percent yields a condenser with ten percent less volume than the unenhanced case. (Author)

AD-A050 187/4CP PC **A05**/MF **A01**
Pennsylvania State Univ University Park Applied Research Lab
Computer-Assisted Design of Pump Impellers
Technical memo.
M. C. Brophy. 5 Jan 78, 100p Rept no. TM-78-02
Contract N00017-73-C-1418

Descriptors: *Impellers, *Pumps, *Marine engines, *Computer aided design, Computer programs, Blade airfoils, Two dimensional, Three dimensional, Streamline shape, Curvature, Axially symmetric flow, Fabrication, Mathematical analysis, Marine surface propulsion.
Identifiers: Fortran, Calcomp plotters.

A computer program was written to aid the engineer in the design of pump impellers. The design process first considers the one-dimensional analysis and then proceeds to the two- and three-dimensional construction of the impeller blading that will enable the pump to meet the design operating condition. The program incorporates the Streamline Curvature Method to determine the axisymmetric flow through the pump and employs techniques which are similar to the Mean Streamline Method of blade design. Computer generated plots of the various impeller views are included, and a completed design ready for fabrication is produced. The designer is encouraged at many points within the program to modify the design method as required by his individual needs or desires. A sample design is presented for a pump which is to be used as a model for a high-speed, marine surface craft, propulsion unit. (Author)

AD-A050 206/2CP PC **A06**/MF **A01**
University of South Florida Tampa
Theory and Computer Program for Transfer Function Identification by the GRAM Identifier with Application to Undersea Vehicles
Technical memo.
V. K. Jain, G. J. Dobeck, and L. J. Lawdermilt. Feb 78, 106p NCSL-TM-204-78
Contract N61331-75-C-0012
Prepared in cooperation with Georgia Inst. of Tech., Atlanta, Contract N61339-75-C-0122.

Descriptors: *Computer programs, *Underwater vehicles, Self noise, Transfer functions, Parametric analysis, Flight testing, Dynamic response, Mathematical models, Computer printouts, Sonar signals, Acoustic detection.
Identifiers: GRAM computer program.

A method for the analysis of submerged vehicle dynamics is described. It enables the test engineer to identify the transfer function parameters from actual flight-test data (for post-flight analysis), or from simulated trajectories (for designing tow-test maneuvers), via the computer program GRAM. The method is noniterative and yields reliable estimates in the presence of disturbances and instrumentation noise. (Author)

AD-A050 777/2CP PC **A03**/MF **A01**
Stevens Inst of Tech Hoboken N J Davidson Lab
Momentum Theory of a Propeller in a Shear Flow
Final rept. 1 Apr 77-31 Mar 78
Theodore R. Goodman. Feb 78, 39p Rept no. SIT-DL-78-2003
Contract N00014-77-C-0297

Descriptors: *Propellers(Marine), *Fluid flow, *Shear properties, Momentum, Integral equations, Computer programs, Wake, Trailing vortices, Flow fields, Approximation(Mathematics), Velocity.
Identifiers: Shear flow.

The momentum theory of moderately loaded propellers has been generalized to account for the effects of shear in the oncoming stream. A condition to determine the distribution of thrust for optimum efficiency is derived which generalizes a condition derived by Betz for a propeller in a uniform flow. This condition leads to a nonlinear integral equation, and a computer program has been developed for solving it. Results for a propeller of a given radius in a particular wake are presented and discussed. (Author)

AD-A050 908/3CP PC **A10**/MF **A01**
Massachusetts Inst of Tech Cambridge Dept of Ocean Engineering
Development of Analytical and Empirical Systems for Parametric Studies of Design and Fabrication of Welded Structures
Final rept. 1 Dec 74-30 Nov 77
Vassilios J. Papazoglou, and Koichi Masubuchi. 30 Nov 77, 215p
Contract N00014-75-C-0469

Descriptors: *Weldments, *Aluminum, Mathematical prediction, Stress strain relations, Welding, Distortion , Transverse, Shrinkage, Longitude, Welded joints, Ship structural components, Airframes, Buildings, Thermal stresses, Residual stress, Computer programs.

Part I of the report covers the development of a monograph entitled 'Analysis of Design and Fabrication of Welded Structures.' The monograph deals with the prediction of stresses, strains and other effects produced by welding. Part II covers the development of analytical means for predicting and controlling weld distortion in welded aluminum structures. Distortion in welded structures is caused by three fundamental dimensional changes, namely transverse shrinkage, longitudinal shrinkage and angular change. During the fabrication of actual structures, such as ships, airplanes and buildings which have various types of joints, these dimensional changes are combined. Therefore, shrinkage distortion that occurs in structures can be extremely complex. After a brief introduction, Section 2.2 discusses thermal stresses during welding, residual stresses and distortion in a general manner. The subsequent sections up to Section 2. 6 discuss the analytical and experimental investigations carried out at M.I.T. on the prediction of various fundamental types of distortion. Finally, Section 2. 7 deals with methods of distortion reduction, as they were tested by various investigators at M.I.T. (Author)

AD-A051 322/6CP PC **A03**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Analytical Ship Residuary Resistance Prediction
Gabor Karafiath. Nov 77, 38p Rept no. SPD-800-01

Descriptors: *Ship hulls, *Structural response, *Ocean waves, Mathematical prediction, Shock resistance, Residuals, Coefficients, Computer programs, Taylors Series, Errors, Mathematical models.

This report attempts to verify the hypothesis that the ratio of the residuary resistance coefficients (C sub R) for two sufficiently similar ships is equal to the ratio of their wave resistance coefficients (C sub W). Several test cases are constructed using Series 60 and Taylor Standard Series ships. Wave resistance coefficients are obtained from the evaluation of the Mitchel integral by Hsiung's method which, within the limitations inherent in thin ship theory, can be applied to any ship shape. For all the test cases, calculated wave resistance coefficients and the residuary resistance coefficients are presented.

AD-A051 809/2CP PC **A10**/MF **A01**
Pittsburgh Univ Pa Center for International Studies
Computerized Programs for Improving Overhaul Planning
D. N. McLaughlin. Nov 75, 203p Rept no. 1634-01-1-1460
Contract N00604-75-C-0431

Descriptors: *Maintenance management, *Repair, *Frigates, Computer programs, Automation, Data processing, Naval planning, Cost analysis, Manpower utilization, Production control, Scheduling, Systems management.
Identifiers: FF 1052 class vessels.

Twelve data systems associated with the planning and management of ship overhauls are evaluated relative to their implementation with automatic data processing techniques. This effort is part of the shipyard's Overhaul Improvement Program, directed initially toward FF-1052 class ships. (Author)

AD-A052 151/8CP PC **A04**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Computation Mathematics/Logistics Dept
Interactive Parameter Analysis Program (IPAP) (User's Manual) (Revision)
Final rept.
E. R. Dixon, B. M. Thomson, and W. F. Starkweather. Jul 77, 58p Rept no. CMLD-77-19

Descriptors: *Naval architecture, *Computer aided design, *Programming manuals, Interactive graphics, Computer programs, Computer graphics, Correlation techniques, Data reduction, Curve fitting.

This manual describes the operation of an interactive graphics computer program which assists ship designers in the identification of correlations and trends in ship design parameters. The program displays points representing parameter values of a selected group of ships, and enables the engineer to fit to these points and record analytic curves. (Author)

AD-A052 710/1CP PC **A06**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
A Review of Resistance Prediction and Design Methods for Strut-Pod Inlets
Pierre Lafrance. Mar 78, 117p Rept no. SPD-789-01

Descriptors: *Drag, *Hydrodynamic configurations, *Struts, Mathematical prediction, Computer programs, Skin friction, Waterjet propulsion, Water jets, Inlets, Cavitation, Coefficients, Surface effect ships, Hydrofoils, Boundary layer flow, Potential flow.

Two aspects of strut-pod waterjet inlet technology are reviewed in this report. First, hydrodynamic aspects of inlet design are discussed and various design methods are presented. Second, the subject of drag prediction is briefly reviewed, state-of-the-art drag prediction methods are presented and their predictive accuracy is compared. For super-high speed applications (approximately 100 kts), a variable area concept with auxiliary strut vanes is recommended. For speeds below 50 kts, fixed area inlets should suffice. Intermediate speed applications should be investigated on a case-by-case basis to determine if auxiliary vanes are desirable. (Author)

AD-A052 718/4CP PC **A06**/MF **A01**
Naval Coastal Systems Lab Panama City Fla
Prediction of Acceleration Hydrodynamic Coefficients for Underwater Vehicles from Geometric Parameters
Technical rept.
D. E. Humphreys, and K. W. Watkinson. Feb 78, 112p Rept no. NCSL-TR-327-78

Descriptors: *Underwater vehicles, *Hydrodynamics, Fluid dynamics, Coefficients, Loads(Forces), Acceleration, Equations of motion, Geometry, Shape, Dynamic response, Potential theory, Analytic functions, Moment of inertia, Computations, Computer programs, Potential flow.
Identifiers: *Hydrodynamic coefficients.

A compilation of methods for analytically calculating the acceleration hydrodynamic coefficients from the geometric and mass distribution characteristics of an underwater vehicle is presented. Each of the coefficients in the longitudinal and lateral planes are treated in the order introductory description; relative importance in characterizing the vehicle dynamic response; causal relationship; and analytical expression for calculating the value of the coefficient. Relationships for cross-coupled and non-linear hydrodynamic coefficients arising from potential flow theory are derived. All of the techniques have been implemented as part of the computer program GEORGE, a program for computing underwater vehicle dynamic stability characteristics in use at NCSL since 1972. Comparison of experimental and computed results is presented, along with a physical description of the generalized underwater vehicle used as the basis for the calculations and graphic representations contained in the report. (Author)

AD-A053 644/1CP MF **A01**
Transportation Systems Center Cambridge Mass
The Cutter Resource Effectiveness Evaluation (CREE) Program -- A Guide for Users and Analysts
Final rept. Jun 75-Jun 77
David S. Prerau. Mar 78, 174p TSC-USCG-77-3, USCG-D-48-78
Availability: Microfiche copies only.

Descriptors: *Coast Guard ships, Computerized simulation, Computer programs, Mission profiles, Operational effectiveness, Performance(Engineering), Hydrofoil craft, Air cushion vehicles, Programming manuals, FORTRAN, Visibility, Sea states, Towing.
Identifiers: *CREE computer program, Scenarios.

The Cutter Resource Effectiveness Evaluation (CREE) project has developed a sophisticated, user-oriented computer model which can evaluate the effectiveness of any existing Coast Guard craft, or the effectiveness of any of a number of proposed alternative craft (such as a hydrofoil or an air cushion vehicle), in the performance of a selected set of Coast Guard missions, in a given location under specified environmental conditions. The first part of this report describes the CREE Model computer program from the user's viewpoint, and includes complete details on the use of the program. The second part of the report discusses for analysts the structure of the CREE program and some of the difficult theoretical concepts behind it. (Author)

AD-A053 956/9CP PC **A04**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
Depot Maintenance Planning and Programming System (DMPPS). Volume 5. Synthesizer Subsystem
Final rept. Jul 74-Jul 77
Jean K. St. Laurent. Apr 78, 55p Rept no. DTNSRDC-78/024

Descriptors: *Maintenance management, *Shipyards, *Job shop scheduling, Computer programs, Work measurement, Manpower utilization, Resource management, Cost analysis, Naval budgets, Feedback, Flow charting, FORTRAN, Input output processing.

The DMPPS (Depot Maintenance Programming and Planning System) consists of several separate modules which interface through various files. The Synthesizer module, using the program XPLODE, combines the appropriate repair and alterations matrices with estimates of direct labor mandays required for each availability from the Depot Maintenance Assignment File (DMAF) and produces a Shop File, A SWBS File, and a SWBS-Shop Matrix File. These files, which show the distribution of the projected workloads among the 9 single-digit SWBS categories and the 20 shops (19 production shop categories plus other direct), are used by the Report Generator Subsystem (Volume 6) to produce summary reports.

AD-A054 238/1CP PC **A04**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
Depot Maintenance Planning and Programming System (DMPPS): Volume 2 - Preprocessor Subsystem
Final rept. Jul 74-Jul 77
Linda L. Lamatrice, and Jean K. St. Laurent. May 78, 71p Rept no. DTNSRDC-78/021

Descriptors: *Maintenance management, *Shipyards, *Computer programs, *Preprocessing, Resource management, Naval budgets, Manpower utilization, Scheduling, Naval logistics, Management planning and control, Supply depots, Data bases, Computer files, Repair, Modification.

The Depot Maintenance Planning and Programming System (DMPPS) is a large computer system developed over a period of two and a half years by the David W. Taylor Naval Ship Research and Development Center. The System was developed to project shipyard resource requirements (i.e., labor mandays and costs as well as material costs) by shipyard production shop and by ship work breakdown structure (SWBS). It enables management to assess the impact on the shipyard and ship systems of: Changes in depot-level maintenance/alterations policy; Major changes in force levels and/or composition; and Budgetary constraints. DMPPS consists of a network of interdependent computer programs written in FORTRAN IV. This document presents the IBM 360/370 version of the DMPPS program modules. The modules have been grouped into six subsystems. Each of Volumes 2-7 of this document describes, in detail, one of these subsystems. An executive summary of the entire DMPPS is presented in Volume 1.

AD-A054 499/9CP PC **A05**/MF **A01**
Arinc Research Corp Annapolis Md
Establishment of Reliability and Maintainability Data Bank for Shipboard Machinery. Volume 1
Final rept.
E. J. Lutz, Jr, and D. J. Hoffman. Mar 73, 96p Rept no. OE13-01-1-1224-VOL-1
Contract N00024-72-C-5388

Descriptors: *Ship auxiliary equipment, *Ship decks, *Maintenance management, *Logistics management, Identification, Data bases, Reliability, Maintainability, Repair, Corrections, Operational readiness, Specifications, Military requirements, Computer programs, Modification.

This report presents the procedures and techniques established by ARINC Research and used to analyze corrective-maintenance data on shipboard equipments and to develop reliability and maintainability indices. These indices, along with the basic equipment identification and source data, are conveniently displayed on format sheets, which are compiled in Volume II in Component Identification Number (CID) sequence and by Generic Groups. (Author)

AD-A054 500/4CP PC **A99**/MF **A01**
Arinc Research Corp Annapolis Md
Establishment of Reliability and Maintainability Data Bank for Shipboard Machinery. Volume II
Final rept.
E. J. Lutz, Jr, and D. J. Hoffman. Mar 73, 685p
Rept no. OE13-01-1-1224-VOL-2
Contract N00024-72-C-5388

Descriptors: *Ship auxiliary equipment, *Ship decks, *Maintenance management, *Logistics management, Identification, Data bases, Reliability, Maintainability, Repair, Corrections, Operational readiness, Specifications, Military requirements, Computer programs, Modification.

See AD-A054 499 for abstract.

AD-A055 321/4CP MF **A01**
Coast Guard Washington D C Oceanographic Unit
Experiments in Small Craft Leeway
Oceanographic rept. 1967-1971
Charles W. Morgan, Savage E. Brown, and Robert C. Murrell. 1978, 96p Rept no. CGOV-TR-77-2
Availability: Microfiche copies only.

Descriptors: *Life rafts, *Boats, Wind velocity, Search and rescue, Survival(General), Computer programs, Ocean currents, Drift, Coast Guard research, Inflatable structures.
Identifiers: Mark-7 inflatable life rafts, Leeway.

This report describes a series of experiments by the Coast Guard Oceanographic Unit in the study of small craft leeway. The report tabulates the data collected during the experiments and reports on a preliminary analysis of the relationship between small craft leeway speed and wind speed. This preliminary analysis indicates that leeway of boats less than 30 feet in length is about 6% of the wind speed at 20 to 30 knots wind speed. (Author)

AD-A055 592/0CP PC **A06**/MF **A01**
Boeing Co Seattle Wash
EMP Coupling Analysis for H.M.S. Sheffield
Final rept.
Robert S. Carter, and Donald E. Young. May 78, 119p Rept no. D194-10043-1
Contract N60921-77-C-0185

Descriptors: *Electromagnetic induction, *Coupling(Interaction), *Electromagnetic pulses, Ship antennas, Ship masts, Electric cables, Computations, Computer applications, Electromagnetic pulse simulators, Comparison, Mathematical models, Transfer functions.
Identifiers: Sheffield vessel, WIRANT computer program, Destroyers.

This report presents the results of an electromagnetic modeling analysis of the British destroyer H.M.S. Sheffield. EMP coupling models were developed for selected masts, antennas, and cabling aboard ship. Calculating of EMPRESS induced responses to these items were made using the computer code WIRANT. The calculated responses were compared to test data obtained on these two items by NSWC. (Author)

AD-A056 090/4CP PC **A10**/MF **A01**
Massachusetts Inst of Tech Cambridge Dept of Ocean Engineering
An Experimental Investigation of Wall Effects on Supercavitating Hydrofoils of Finite Span
Master's thesis
Michael Rex Maixner. Aug 77, 214p
Contract N00014-76-C-0358

Descriptors: *Hydrofoils, *Hydrodynamics, Water tunnels, Walls, Flow visualization, Sizes(Dimensions), Corrections, Cavitation, Downwash, Vortex shedding, Angle of attack, Pressure measurement, Computer applications, Computer programs, Theses.
Identifiers: *Supercavitating hydrofoils.

A geometrically similar family of three supercavitating hydrofoils was tested in a variable pressure water tunnel. The half-span foils were of elliptical planform; the ratio of foil half-span to tunnel height was 1/4 for the small foil, 1/2 for the medium foil, and 3/4 for the largest foil. The tunnel was of square cross section. Lift, drag, moment, tunnel speed, ambient pressure, and cavity pressure were measured for attack angles from 8 to 21 degrees and a variety of ambient pressure settings; cavity length measurements were obtained from photographs. For the small and medium foils, it was sufficient to correct only for the effect on downwash of the images of the trailing vortices. The large foil data, however, required further correction; upon application of the same corrections which were applied to the data for the two smaller foils, the force and moment data for the large foil plotted slightly lower than did the data for the two smaller foils, while the cavity length data for the large foil indicated cavity lengths significantly larger than for either of the theoretical predictions or the cavity length data for the two smaller foils.

AD-A056 554/9CP PC **A06**/MF **A01**
Defence Research Establishment Atlantic Dartmouth (Nova Scotia)
PHHS. A Fortran Programme for Ship Pitch, Heave and Seakeeping Prediction
Technical memo.
M. Mackay, and R. T. Schmitke. Apr 78, 105p
Rept no. DREA-TM-78/B

Descriptors: *Seakeeping, *Ship motion, Computer programs, Control systems, Programming manuals, Drift, Slamming, Ocean waves, Corrections, Motion sickness, Tolerances(Physiology), Fortran, Canada.
Identifiers: PHHS computer program.

The theoretical basis and user's manual are described for the computer program PHHS (Pitch and Heave in Head Seas), developed for seakeeping prediction purposes. In addition to the usual vertical motion calculations, algorithms are included for added resistance, relative motion corrections (wave profile and dynamic swell-up), slamming pressures, and human tolerance to vertical motion. Worked examples and a FORTRAN listing of the program are included.

AD-A056 617/4CP PC **A03**/MF **A01**
Naval Coastal Systems Center Panama City Fla
Trade-Off Analysis of Propulsion Systems for Submersibles (TAPSS)
Technical memo.
R. S. Peterson. Jul 78, 45p Rept no. NCSC-TM-232-78

Descriptors: *Marine propulsion, *Submersibles, *Trade off analyses, Propulsion systems, Computerized simulation, FORTRAN, Costs, Computer aided design, Drag, Mine countermeasures, Self propelled.
Identifiers: TAPSS computer program.

This report documents Trade-off Analysis of Propulsion Systems for Submersibles (TAPSS), a FORTRAN computer program designed to aid in optimizing the size, cost, and performance of a preprogrammed, dry, underwater vehicle by performing propulsion-related parameter trade-offs. The program calculates engine power, vehicle size, and approximate cost as a function of input speeds and endurance to facilitate the examination of vehicle configurations and their capability to fulfill mission requirements. The program will assist in the conceptual optimization of the system configuration. (Author)

AD-A056 798/2CP PC **A06**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md
Depot Maintenance Planning and Programming System (DMPPS). Volume 3. Alterations Subsystem
Final rept. Jul 74-Jul 77
Michael J. Lamatrice , and Jean K. St. Laurent. Jul 78, 107p Rept no. DTNSRDC-78/022

Descriptors: *Supply depots, *Maintenance management, *Management planning and control, *Computer programs, *Shipyards, *Computer programming, Computer applications, Requirements, Resources, Cost analysis, Networks, Military requirements, Naval planning, Estimates, Predictions, Fortran.
Identifiers: Depot maintenance planning and programming system, Systems development, DMPPS(Depot Maintenance Planning and Programming System).

The Depot Maintenance Planning and Programming System (DMPPS) is a large computer system developed over a period of two and a half years by the David W. Taylor Naval Ship Research and Development Center (DTNSRDC), Code 186 for the Naval Sea Systems Command (NAVSEA), Code 070T. The System was developed to project shipyard resource requirements (i.e., labor mandays and costs as well as material costs) by shipyard production shop and by ship work breakdown structure (SWBS). It enables management to assess the impact on the shipyards and ship systems of changes in depot-level maintenance/alterations policy, major changes in force levels and/or composition and budgetary constraints. DMPPS consists of a network of interdependent computer programs written in FORTRAN IV. It was developed at DTNSRDC using the CDC 6000 series computers and was subsequently converted for the IBM 360/370 series computers. It is now installed and operational at the NAVSEA 070 computer terminal (which accesses an IBM 370/168 computer). This document presents the IBM 360/370 version of the DMPPS program modules. The modules have been grouped into six subsystems. Each of Volumes 2-7 of this document describes, in detail, one of these subsystems. An executive summary of the entire DMPPS is presented in Volume 1.

AD-A057 190/1CP PC **A04**/MF **A01**
Naval Coastal Systems Center Panama City Fla
Development and Application of a Multiloop, Laplace Domain Analysis Technique to Control System Design for Underwater Vehicles
Technical memo.
R. W. Miller, and G. J. Dobeck. Jul 78, 58p Rept no. NCSC-TM-237-78

Descriptors: *Underwater vehicles, *Control systems, Systems engineering, Computer applications, Prototypes, Feedback, Transfer functions, Fortran, Computer programs, Input output processing, Laplace transformation, Flow charting, Subroutines.
Identifiers: *Computer aided design.

Implementation of a computer program is described which is applied to design of multiple input-output control systems for underwater vehicles. Two example designs are given. Program operation is explained through use of an example design using block diagrams and root locus. (Author)

AD-A057 655/3CP PC **A09**/MF **A01**
Massachusetts Inst of Tech Cambridge Man-Machine Systems Lab
Human and Computer Control of Undersea Teleoperators
Technical rept. 15 Mar 77-14 Jun 78
Thomas B. Sheridan, and William L. Verplank. 15 Jul 78, 185p
Contract N00014-77-C-0256

Descriptors: *Man machine systems, *Man computer interface, *Remote control, *Underwater vehicles, *Manipulators, *Teleoperators, Underwater, Underwater communications, Performance(Human), Computer programs,

Models, Computer communications, Mathematical models.
Identifiers: Supervisory controls.

This is a review of factors pertaining to man-machine interaction in remote control of undersea vehicles, especially their manipulators and sensors. Emphasis is placed on human operator control of such teleoperator systems as a function of degree of automation, sensor-control integration and task demands for underwater search, object recovery and manipulation. Models of operator-computer performance are considered, particularly with respect to human supervisory control of semiautonomous systems. Sections of the report discuss: teleoperated submersible vehicles or work platforms; undersea tasks and how they can be analyzed; relative roles of human and computer or other control elements; control hardware (sensors, communication, propulsion, manipulation, control station) and how it affects the human controller; control software for computer-aided manipulation, including a review of various languages and algorithms presently available; human operator performance in manipulator control (a review of what we now know); present and prospective theoretical models of supervisory control; and finally, the needs for research in this area. (Author)

AD-A058 533/1CP PC **A05**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda Md Ship Performance Dept
Lifting Line Calculations for Hydrofoil Performance at Arbitrary Froude Number and Submergence. Part 1. Fixed Shape Elliptical Circulation Distribution
Michael B. Wilson. Jun 78, 97p Rept no. DTNSRDC/SPD-0839-01

Descriptors: *Hydrofoils, Hydrodynamics, Lift to drag ratio, Aspect angle, Computer programs, Computations, Numerical analysis, Comparison, Asymptotic series, Approximation(Mathematics).
Identifiers: Froude number.

Hydrofoil drag and lift prediction formulas using the lifting line approximation are evaluated numerically using a computer program developed for the purpose. Some results for selected aspect ratios and foil submergences are displayed in several plots of general interest and usefulness, for the case of an elliptic planform hydrofoil supporting an elliptic circulation distribution of fixed shape, but variable strength. Some preliminary comparisons between results obtained numerically and asymptotic formulas are discussed. These show that for certain extreme cases, the wave drag and the Froude-independent part of the lift correction are well predicted by asymptotic relations. For intermediate values of both Froude number and submergence ratio, the asymptotic relations give poor results for wave drag. At most all submergences and Froude numbers the existing asymptotic expressions for the Froude-dependent part of lift correction give poor results.

AD-A059 772/4CP PC **A05**/MF **A01**
David W Taylor Naval Ship Research and Development Center Bethesda MD Computation Mathematics/Logistics Dept
Long Range Planning System/Workload Graph Interface Programs
Final rept. Mar-Aug 78
Linda L. Lamatrice. Aug 78, 96p Rept no. DTNSRDC/CMLD-78/08

Descriptors: *Shipyards, *Scheduling, Computer programs, Planning, FORTRAN.
Identifiers: Fortran 4 programming language, IBM-360/370 computers, CDC-6000 computers, *Shipbuilding.

This report describes a mini-system of four computer programs which form the interface between two existing systems of the Naval Sea Systems Command. The mini-system provides a means of producing workload summary graphs from the shipyard overhaul schedule of the Long Range Planning System. The programs are written in FORTRAN IV and are capable of running on either the IBM 360/370 or the CDC 6000 series computers. (Author)

AD-A060 962/8CP PC **A16**/MF **A01**
Bradford National Corp NY
Cost Effectiveness Study of Wastewater Management Systems for Selected U.S. Coast Guard Vessels. Volume II. Effectiveness Assessment of Candidate Systems
Final rept.
Sidney Orbach. Mar 77, 367p USCG-D-74-77
Contract DOT-CG-52180-A

Descriptors: *Waste water, *Coast Guard ships, *Cost effectiveness, Sanitary engineering, Health, Performance(Engineering), Waste disposal, Personnel, Safety, Pollution, Environmental protection, Computer programs.
Identifiers: *Sewage treatment, Shipboard sewage treatment systems.

A generalized and systematic effectiveness assessment methodology, including a computer program for quantifying the effectiveness of candidate system vessel combinations was developed. The methodology is described and guidelines for its use are presented. The results of applying this effectiveness assessment methodology to the 18 Wastewater Management System (WMS) concepts in configurations suitable for each of the six vessels included in this study are presented. The effectiveness model used is based on the following seven measures of effectiveness: Adaptability for Shipboard Installation, Performance, Operability, Personnel Safety, Habitability, Reliability, and Maintainability. Each effectiveness measure was successively broken down into constituent factors and subfactors, resulting in 111 individual criteria which were used as the basis for quantifying the effectiveness of each viable candidate system on each vessel. The effectiveness attribute data used are also presented. (Author)

AD-A061 282/0CP PC **A03**/MF **A01**
Naval Postgraduate School Monterey CA
Multivariable Control of a Marine Boiler
Master's thesis
Michael Miller. Sep 78, 47p

Descriptors: *Boilers, *Marine propulsion, Control systems, Experimental design, Propulsion systems, Performance(Engineering), Pressure, Problem solving, Computerized simulation, Theses.
Identifiers: *Marine boilers, CONSYN computer program, CSMP-3 programming language.

An integral output controller is developed for small load changes to a Foster Wheeler ESD-III boiler. The CONSYN program, a coding of modern control algorithms, is utilized to produce a feasible control law for a developed state variable boiler model. The resultant closed loop responses of both a full (10th) order and a reduced (7th) order boiler model are determined using CSMP-III, the IBM simulation language. (Author)

AD-708 769/CP HC A03 MF **A01**
California Univ Los Angeles School of Engineering and Applied Science
Case Studies in Computer Simulation.
A. M. Feiler. Mar 70, 33p Rept no. UCLA-ENG-7049
Contract N00014-69-A-0200-4009, Nonr-233(89)

Descriptors: *Data processing systems, Naval shore establishments, Management control systems, Simulation, Shipyards, Information retrieval.
Identifiers: TRANSIM 4 computer code, MIS computer code.

The report describes application of the general-purpose computer simulator, TRANSIM IV, to systems analysis of the Long Beach Naval Shipyard computer systems operating under the shipyard's Management Information System workload. The MIS/Computer System Model is described and results are given for a representative simulation analysis to serve as a demonstration example for further problem-solving applications with the model by the LBNSY staff. (Author)

AD-709 072/CP HC A07 MF **A01**
Naval Ship Research and Development Center Washington D C
The Frank Close-Fit Ship-Motion Computer Program.
Final rept.
Werner Frank, and Nils Salvesen. Jun 70, 144p
Rept no. NSRDC-3289

Descriptors: *Ships, *Motion, *Computer programs, Hydrodynamics, Cargo ships, Cruisers, Destroyers, Ocean waves, Pitch(Motion), Ship hulls, Sonar arrays.

The report is a manual for 'The Frank Close-Fit Ship-Motion Computer Program.' The input and output schemes and the theory are explained in detail. The program computes pitch and heave motions for ships in regular and irregular head waves. The regular wave responses are computed according to an improved version of the Korvin-Kroukovsky strip theory. The irregular seaway is represented by the Pierson-Moskowitz Sea Spectrum and statistical response parameters are computed for pitch and heave as well as for absolute and relative vertical displacment, velocity and acceleration at any point along the length of the ship. A comparison between theory and experiment of the pitch and heave amplitudes and phases for five hull forms is presented and the agreement is satisfactory for both common cruiser-stern ships and high-speed destroyers and also for hulls with large bulbs and sonar arrays. (Author)

AD-712 546/CP HC A06 MF **A01**
Battelle Memorial Inst Columbus Ohio Columbus Labs
Mark I Deep Dive System (Dds-1) Handling Study. Phase I. Conceptual Design.
Summary technical rept.
David C. Doerschuk, David E. Adkins, and James S. Glasgow. 1 Oct 70, 120p
Contract N00014-70-C-0072

Descriptors: *Sea rescue equipment, Design, *Hoists, Design, *Underwater vehicles, Rescues, Deployment, Recovery, Safety, Alignment, Performance(Engineering), Feasibility studies, Ships, Motion, Computer programs.
Identifiers: Telescoping cranes, Mark 1 deep dive system.

The report covers selection of an optimal concept for handling the Mark I Deep Dive System's Personnel Transfer Capsule, in a Sea State 3, from ATS, ASR, and ARS Class ships. Included are descriptions of some of the many possible handling system concepts generated by idea conferences and a literature search. The more feasible concepts are analyzed and compared using a set of eleven comparison factors. The optimal system, an articulated telescoping crane, is chosen according to its overall performance on the comparison factors. (Author)

AD-713 887/CP PC **A06** MF **A01**
Naval Ship Research and Development Center Washington D C
Computer Aided Input/Output for Use with the Finite Element Method of Structural Analysis.
Final rept.
Robert D. Rockwell, and Daniel S. Pincus. Aug 70, 113p Rept no. NSRDC-3402

Descriptors: *Ship structural components, Structural properties, *Structural properties, *Computer programs, Input-output devices, Stresses, Strain(Mechanics).
Identifiers: Finite element analysis, PHISPL computer program, IDLZ computer program, FORTRAN.

The enormous computational ability of modern computers has encouraged development of the finite element method of structural analysis. However, preparing the large amount of input data and interpreting the large amount of output data generated by the analysis can be very time consuming and costly. Programs IDLZ and Phi SPL were developed as aids to computer input/output. IDLZ divides a plane surface into triangular elements and generates required input data for the analysis program. Phi SPL plots the output data in a form which can be quickly interpreted by the analyst. (Author)

AD-715 662/CP PC **A05** MF **A01**
California Univ Berkeley Coll of Engineering
Experimental Studies of the Behavior of Spar Type Stable Platforms in Waves.
Bruce H. Adee, and Kwang June Bai. Jul 70, 96p
Rept no. NA-70-4
Contract N00014-67-A-0114-0008, N00014-69-A-0200-1023

Descriptors: *Spar buoys, Motion, Ocean waves, Damping, Stability, Hydrodynamics, Mathematical prediction, Stabilized platforms, Computer programs.
Identifiers: SPAR computer program.

Newman has developed a linearized theory for the motions of a slender body of revolution, with vertical axis, which is floating in the presence of regular waves. In the present paper a series of experimental investigations were made and compared with Newman's theory. Experimental measurements of motions were made in regular and irregular long crested waves. Pressures at several locations on the models were also measured and compared with the theory. The measurements of motions give excellent agreement with theory for slender body. An extended formula was developed for heave motion for small slenderness ratio of the body. The theoretical prediction for pressure on the body also was found to give excellent agreement with the experimental measurement except near the free surface. Observation of vortex generation was made by electrolysis. (Author)

AD-717 609/CP PC **A04** MF **A01**
Naval Postgraduate School Monterey Calif
Motion of a Ship at the Free Surface.
Master's thesis
David Waller Chenault, II. Dec 70, 59p

Descriptors: *Ships, Motion, Incompressible flow, Damping, Ship hulls, Computer programs, Theses.
Identifiers: Inviscid flow.

Forced harmonic heaving motion of a ship at the free surface of an inviscid incompressible fluid is analyzed. Added mass and damping are determined using finite element techniques. Iso-parametric elements with curved boundaries allow accurate representation of the hull shape. A computer program is developed and results are found to agree closely with previously obtained theoretical and experimental results. (Author)

AD-717 681/CP PC **A05** MF **A01**
Bolt Beranek and Newman Inc Cambridge Mass
The Unsteady Hydrodynamics and Control of Hydrofoils Near a Free Surface.
Final rept. 1 Aug 69-30 Apr 70
Joseph I. Smullin, and Erich K. Bender. 22 Jan 71, 86p Rept no. BBN-1970
Contract N00014-70-C-0032

Descriptors: *Hydrofoils, *Hydrodynamics, Computer programs, Loading(Mechanics), Lift, Pitch(Motion), Moments, Trailing edge, Pressure, Numerical analysis, Control.
Identifiers: FORTRAN, FORTRAN 2 programming language.

A discussion is given of the development of a digital computer program to compute hydrofoil loads and some aspect of hydrofoil control. The program computes the lift, pitching moment, and flap hinge moment on a two-dimensional hydrofoil with a trailing edge flap operating near a free surface with waves. The computational approach involves the numerical solution of an integral equation relating an upwash distribution to a kernel function and pressure distribution. The pressure distribution is expanded in a truncated Glauert series; the integration is carried out numerically using a Gaussian quadrature; and the coefficients of the Glauert series are evaluated by a minimum error collocation method. The control problem investigated involves the positioning of a pivoted hydrofoil by means of a servo-controlled trim tab. When the foil is pivoted at its quarter chord point and control is implemented solely by means of a servo tab, the system is virtually uncontrollable. However, by pivoting the foil off the quarter chord point or by augmenting the servo tab with a servo attached directly to the foil, the system can be controlled. (Author)

AD-718 898/CP PC **A06** MF **A01**
Massachusetts Inst of Tech Cambridge Dept of Naval Architecture and Marine Engineering
Computation of Periodic Propeller Forces in Non-Uniform Flows Using a Lifting Surface Model
Final rept.
Neal A. Brown, and Fritz Roland Bjorklund. 28 Jan 70, 119p Rept no. 70-19
Contract Nonr-1841(80)

Descriptors: *Propellers(Marine), *Downwash, *Propeller blades, *Vortices, Lift, Corrections, Mathematical prediction, Computer programs, Force(Mechanics).
Identifiers: Nonuniform flow, Computer analysis, FORTRAN 4 programming language, FORTRAN.

The report describes a method for calculating downwash effects of both radial and streamwise vortex systems of a propeller blade and applying these results as a correction to the prediction of the propeller blade characteristics utilizing a lifting line model. A computer program was developed using FORTRAN 4. (Author)

AD-719 938/CP PC **A03** MF **A01**
Naval Construction Research Establishment Dunfermline (Scotland)
Computer Programs for Statistical Analysis of Extreme-Value Strain Data
Dec 70, 29p NCRE/R.565, NSTIC-28714

Descriptors: *Programming(Computers), Strain(Mechanics), *Ship hulls, Loading(Mechanics), Statistical analysis, Ocean waves, Strain gages, Stresses, Design, Great Britain.
Identifiers: FORTRAN, K24B computer program, K24A computer program, K63A computer program, K63B computer program.

Details are given of three computer programs for analysing strain data recorded on ships using NCRE maximum-reading strain gauges. Guidance is provided on interpretation of strain records, preparation of data for computer analysis and plotting of results. Extreme-value distributions of Gumbels First and Third Types may be computed. (Author)

AD-722 690/CP PC **A03** MF **A01**
Naval Ship Research and Development Center Washington D C
Numerical Calculation of the Added Mass and Damping Coefficients of Cylinders Oscillating in or Below a Free Surface
Final rept.
J. W. Bedel, and C. M. Lee. Mar 71, 45p Rept no. NSRDC-3551

Descriptors: *Hulls(Marine), Oscillation, Ship hulls, Submarine hulls, Damping, Computer programs, Roll, Pitch(Motion).
Identifiers: YFA4 computer program, FORTRAN 4 programming language, FORTRAN.

The computer program presented herein provides values of the added mass and damping coefficients of infinitely long horizontal cylinders oscillating in or below a free surface. The report includes the theoretical background, the general structure, the details of the input and output schemes, and the program listing. (Author)

AD-723 212/CP PC **A04** MF **A01**
Naval Ship Research and Development Center Washington D C
User's Manual for the Modified Finite Element Program FINEL
Final rept.
John C. Adamchak. Nov 70, 65p Rept no. NSRDC-3609

Descriptors: *Structural parts, Structural properties, *Programming(Computers), Instruction manuals, *Ship hulls, Structural properties, Stresses, Elasticity, Input-output devices, Cantilever beams, Panels(Structural), Hydrostatic pressure, Flanges, Bending.
Identifiers: FINEL computer program, Finite element analysis, FORTRAN 4 programming language, FORTRAN, Plates(Structural members).

The report is a manual for the use of a general finite element computer program designed to perform the elastic analysis of complex structural components or their assemblage. Good engineering results can be obtained through the judicious application of finite element techniques, in which the real structure is idealized into discrete plate or bar elements allowing for the solution of the structural system by means of efficient matrix operations. Input instructions are described and illustrative examples are included. This program is a further modification of one originally developed by Prof. J. R. Paulling of the University of California at Berkeley and later modified for use at the Naval Ship Research and Development Center (NSRDC). This latest version offers additional elements in the element library as well as additional capabilities in other areas. (Author)

AD-724 347/CP PC **A05** MF **A01**
Michigan Univ Ann Arbor Dept of Naval Architecture and Marine Engineering
Automatic Creation of Fair Ship Lines
Final rept.
Arthur M. Reed, and Horst Nowacki. Oct 70, 92p
Rept no. 02148
Contract N00024-69-C-5141

Descriptors: *Fairings, Mathematical models, *Ship hulls, Design, Marine engineering, Specifications, Hydrodynamic configurations, Mapping(Transformations), Computer programs.
Identifiers: Computer aided design.

The report presents the results of a development of an automatic ship lines creation procedure for concept design purposes, performed under contract for the Naval Ship Engineering Center. The lines creation procedure is based on conformal mapping functions for the representation of the underwater part of the ship sections, and on an influence polynomial representation of the sectional area curve, the design waterline, the abovewater sections, and other features of the hull shape. A set of computer programs was developed that gives the user control over those essential hull form parameters which are known in the earliest stages of design and traditionally used by the naval architect to specify his design intentions. The programs return the mathematical definition of a fair ship hull meeting the given requirements whenever feasible. The results can be used for display and evaluation, and, if desired, as a starting point for further automatic lines manipulation, particularly in the active graphics mode. (Author)

AD-724 642/CP PC **A08** MF **A01**
Naval Ship Research and Development Center Washington D C
Computer Programs for Plate Vibration Including the Effects of Clamped and Rotational Boundaries and Cylindrical Curvature-Option 2
Final rept.
Ralph C. Leibowitz, and Dolores R. Wallace. Jan 71, 164p Rept no. NSRDC-2976B

Descriptors: *Numerical analysis, *Computer programs, *Vibration, Numerical analysis, *Ship plates, Vibration, Mathematical models, Input-output devices, Resonant frequency, Nomographs, Equations of motion, Harmonic analysis.
Identifiers: Plates(Structural members), WCGFRE computer program, WHITE computer program, PLFREQ computer program, SUNFRE computer program, YNGFRE computer program.

A comparative study is made of various methods for computing the free vibration modes and natural frequencies of thin plates with clamped and rotational supports and cylindrical curvature. The methods include closed form analytical, digital computer, nomographic, and graphical computations. Based on the results, preferred methods of computation are recommended. These methods-Option 2-are of particular value in extending previously formulated digital computer programs for obtaining the vibroacoustic response to turbulence excitation of a plate. Computer results for a particular case provide a comparison of the effect of clamped-clamped and simply supported boundaries on the vibratory response of a plate subject to turbulence excitation. (Author)

AD-724 860/CP PC **A03** MF **A01**
New Hampshire Univ Durham Engineering Design and Analysis Lab
Analysis of the Motion of a Tri-moored Buoy with Neutrally Buoyant Legs for Installation in the Deep Ocean Environment
Technical rept.
G. N. Sniffin, and G. H. Savage. Feb 68, 41p
Rept no. TR-104
Contract N00014-67-A-0158-0004
Report on Project Seaspider-Pacific.

Descriptors: *Cables(Mechanical), Motion, *Buoys, Mooring, Pacific Ocean, Ocean currents, Underwater, Buoyancy, Drag, Iterative methods, Mathematical models, Computer programs.
Identifiers: Seaspider project, Underwater currents, Computer aided analysis.

The report is a motion analysis of a tri-moored buoyant structure known as Seaspider designed and tested by Savage and Hersey - 1965. The structure consists of a sub-surface buoy approximately 100 feet below the surface and anchored by three neutrally buoyant legs as shown in Fig. 1. The anchors are placed at the apexes of an equilateral triangle and the legs are of such a length as to form an angle of 45 degrees with the plane of the bottom. The legs are made neutrally buoyant by attaching glass balls along their length. This analysis was done during the summer of 1967 at the University of New Hampshire. The equations were developed and then programmed for running on the IBM 360 computer. This program appears as Appendix 1. (Author)

AD-725 146/CP PC **A03** MF **A01**
Puget Sound Naval Shipyard Bremerton Wash
An Analysis of the Benefits Obtained Using the NAVSHIPS Cabling/Wiring (WIRES) Computer Program for Ship Overhaul Projects
Final rept. Jul 69-Mar 71
Russell V. Carstensen. 17 May 71, 33p Rept no. PSNS-845-TR-73348

Descriptors: *Programming(Computers), Cost effectiveness, *Ship auxiliary equipment, Electric cables, *Ships, Maintenance, Electrical equipment.
Identifiers: WIRES computer program, *Computer aided design, Computer graphics.

The paper covers the benefits both tangible and intangible, obtained from the use of a portion of the Computer-Aided Ships Electrical Cabling/Wiring System (or more conveniently, WIRES computer program) for ship overhaul and conversion work. The WIRES program was used to generate directly issuable production drawings that were compatible with design standards in effect. The paper covers in limited detail the benefits and corresponding dollar cost savings. In order to more fully cover the subject the paper begins with a discussion of those benefits returned during the design phase of the four projects involved. Examination is then focused on the benefits to management, the production shops, and finally on the possibility of additional uses to which an input deck may be put after its initial purpose has been fulfilled. The paper closes with a set of seven definite conclusions that may be drawn from this examination of the use of the WIRES computer program for ship overhaul and repair projects. (Author)

AD-725 505/CP PC **A05** MF **A01**
Naval Ship Research and Development Center Washington D C
Transient Response Calculation in the Frequency Domain with General Bending Response Program (GBRP)
Research and development rept.
Francis M. Henderson. Feb 71, 90p Rept no. NSRDC-3613

Descriptors: *Beams(Structural), Bending, *Ship hulls, Vibration, *Programming(Computers), Vibration, Equations of motion, Torsion, Mathematical analysis, Vibrators(Mechanical), Fourier analysis, Integral transforms, Computer programs.
Identifiers: General bending response program, GBRP computer program, Spring mass systems.

The General Bending Response Program (GBRP), a digital computer program package for ship vibration analysis, has been augmented to handle calculations of the time response of beam systems under certain types of transient excitation. These excitations are characterized by the fact that their Fourier transforms from the time to the frequency domain can be represented analytically. The method is used to calculate the response of a mass-spring-damper system to a rectangular impulse and of a nonuniform beam to an exponential impulse. A description of the additional data and options required for running problems is included. (Author)

AD-726 455/CP PC **A05** MF **A01**
Massachusetts Inst of Tech Cambridge Dept of Naval Architecture and Marine Engineering
Post-Buckling Behavior of Stiffened Plates with Small Initial Curvature under Combined Loads
Alaa Mansour. Oct 70, 91p Rept no. 70-18
Contract N00014-67-A-0204-0031

Descriptors: *Ship plates, Loading(Mechanics), Stresses, Strain(Mechanics), Bending, Buckling(Mechanics), Partial differential equations, Boundary value problems, Computer programs.
Identifiers: FORTRAN 4 programming language, FORTRAN, Plates(Structural members).

The post-buckling behavior of a stiffened plate with small initial curvature is discussed in this paper. The stiffened plate is idealized by an equivalent orthotropic plate. The basic differential equations are derived and solved under two sets of boundary and loading conditions. Non-dimensional design curves giving the center deflection, critical load, effective breadth, and bending moment are presented for different values of the inplane load, lateral load, virtual aspect ratio, stiffeners characteristics and initial deflection. A computer program is also presented in order to obtain the results for values of the parameters not covered in the design curves. An example on the use of the design curves is given in which the results are compared under different boundary conditions and different initial deflections. (Author)

AD-727 588/CP PC **A04** MF **A01**
Engineering Research Associates Toronto (Ontario)
A Program to Calculate the Pressure Distribution on a Hydrofoil with Pod and Strut
Final rept. Dec 67-Oct 68
Peter A. Bandler, and Michael Ludolph. Oct 68, 59p Rept no. ERA-53-6
Contract N00014-68-C-0208

Descriptors: *Numerical analysis, *Computer programs, *Hydrofoils, Hydrodynamics, Pressure, Camber, Vortices, Hydrodynamic configurations, Computer logic, Mathematical models, Punched cards, Control sequences, Subroutines.
Identifiers: *Pressure distribution, Fortran 4 computer program.

The method to calculate pressure distribution on a hydrofoil with pod and strut near the free surface, developed by J. R. Richardson in report 53-5, has been programmed for the IBM 360/65. The two sections of the present report document: preparation of input data, description of program output, sample inputs and outputs, data sheets, describing the mathematical expressions that were coded, and a listing of the Fortran IV program. (Author)

AD-727 633/CP PC **A04** MF **A01**
Woods Hole Oceanographic Institution Mass
Dynamic Analysis of a Single Point, Taut, Compound Mooring
Technical rept.
Joel P. Brainard. Jun 71, 73p Rept no. WHOI-Ref-71-42
Contract N00014-66-C-0241

Descriptors: *Mooring, Shear stresses, *Mooring buoys, Design, Motion, Damping, Response, Mathematical models, Drag, Loading(Mechanics), Wire, Cables(Mechanical), Differential equations, Computer programs.
Identifiers: Buoy systems, Compound mooring.

An analysis of motion in a taut compound mooring is presented. A model is proposed consisting of a series of discrete masses connected with linear springs. Motion is assumed to be one-dimensional along the longitudinal axis of the model. The analysis predicts the natural frequencies of the model without damping or external forces. These results are used as a basis for analyzing motion of the masses and tensions in the springs when the model is driven with an external force where damping, from tangential drag, is assumed to be proportional to velocity squared. Solutions are obtained by computer programmed numerical techniques. Both steady state and transient cases are studied. Response of the system with alterations of drag land spring stiffness is also studied. (Author)

AD-728 682/CP PC **A07** MF **A01**
Naval Postgraduate School Monterey Calif
Performance Analysis of a Turbo-Type Energy Absorber for an Aircraft Carrier Arresting Gear
Master's thesis
Leo Stanley Rolek, Jr. Jun 71, 131p

Descriptors: *Shock absorbers, Performance(Engineering), *Aircraft carriers, *Arresting gear, Mathematical models, Carrier landings, Turbine parts, Kinematics, Torque, Cooling, Design, Computer programs, Theses.
Identifiers: *Energy absorbers, Computer aided design, Computerized simulation.

The increasing weight and speed of carrier based aircraft are taxing the limit of conventional piston type energy absorbers which are used for arresting gear. Turbo-type absorbers have been proposed as an alternative. This study investigates a turbo-type energy absorber for an aircraft arresting gear under development by the Naval Air Engineering Center. A mathematical analysis, computer simulation and performance prediction are given for each mode of operation. It was initially expected that the absorber could operate in just two modes, forward and reverse, but the analysis shows that four distinct modes are possible, since not only shaft rotation but the path of fluid flow can be reversed. Theoretical performance predictions are also compared with test data from an existing smaller scale version of the absorber. The agreement is excellent. An approximation of scaling effects on power absorption is also presented. It is concluded that the turbo-type absorber is basically adequate to meet the demands of carrier operation for the forseeable future. (Author)

AD-728 772/CP PC **A03** MF **A01**
Massachusetts Univ Amherst School of Engineering
Penetration Reinforcement Design for Spherical Pressure Hulls
George R. Kidd. Jul 71, 47p Rept no. THEMIS-UM-71-3
Contract N00014-68-A-0146

Descriptors: *Hulls(Marine), Design, *Underwater vehicles, Hulls(Marine), Structural shells, Reinforcing materials, Penetration, Hatches, Welds, Hydrostatic pressure, Stresses, Mathematical models, Computer programs.
Identifiers: Computer aided design, Viewports.

Basic criteria are given for the design of reinformcements for penetrations in spherical pressure hulls. Specific design procedures are listed for cylindrical coaming-type reinforcements under three different loading are included. (Author)

AD-729 432/CP PC **A09** MF **A01**
Hamilton Standard Windsor Locks Conn
Noise Detectability Prediction Method for Low Tip Speed Propellers
Final rept. 1 May 70-1 May 71
Frank W. Barry, and Bernard Magliozzi. Jun 71, 188p HSER-5834, AFAPL-TR-71-37
Contract F33615-70-C-1583

See also report dated Jun 71, AD-729 435.

Descriptors: *Propeller noise, Mathematical models, *Propellers(Marine), *Underwater sound, Detection, Sound pitch, Harmonic analysis, Vortices, Broadband, Experimental data, Computer programs.

Experience in the field of quiet aircraft for reconnaissance/surveillance applications indicated a need for a reliable quiet propeller design procedure. The report describes the development of a computer program intended to fulfill this need. The propeller noise detectability computer program predicts propeller harmonic rotational noise using non-steady blade loads and broad-band noise using a new integration method and compares these predictions with an appropriate aural detectability criterion to estimate the minimum undetectable flight altitude. Supporting tasks include development of aural detectability criteria, a theoretical study of the effect of airfoil section shape on vortex noise, static noise tests of several propeller configurations, correlation of unsteady blade loads corresponding to measured harmonic noise levels, design and testing of a new quiet propeller, and a propeller noise detectability trend study. (Author)

AD-729 435/CP PC **A09** MF **A01**
Hamilton Standard Windsor Locks Conn
User's Manual for Propeller Noise Detectability Program
Final rept. 1 May 70-1 May 71
Frank W. Barry. Jun 71, 178p HSER-5835, AFAPL-TR-71-38
Contract F33615-70-C-1583
See also report dated Jun 71, AD-729 432.

Descriptors: *Programming(Computers), *Instruction manuals, *Propeller noise, *Computer programs, *Propellers(Marine), *Underwater sound, Detection, Sound pitch, Harmonic analysis, Vortices, Subroutines, Flow charting, Punched cards.
Identifiers: Fortran, Fortran-4 programming language, Computer aided analysis.

The report is the user's manual for a propeller noise detectability program written in Fortran 4 language. This program consists of ten subroutines which are to be used with the proprietary Hamilton Standard propeller performance program made available to the AFAPL previously. The noise program calculates the propeller harmonic rotational noise and the broad-band noise and compares these predicted noise levels with a selected aural detectability criterion to determine the minimum undetectable altitude. Several calculation and input data options are provided in order to enhance the value of the program to a user and are discussed in this manual. The input data and the computer output for four sample cases are presented and discussed. A listing of the source cards and a flow chart of the ten subroutines are provided. (Author)

AD-731 807/CP PC **A04** MF **A01**
Coast Guard Washington D C
The Operational Capabilities of the Proposed Air Deliverable Anti-Pollution Transfer System (ADAPTS). Volume 2. Documentation of the Simulation Model, BAGSIM
May 71, 75p*
See also Volume 3, AD-731 808.

Descriptors: *Bags(Containers), Air transportation, *Tankers, Accidents, *Water pollution, Control, Mathematical models, Inflatable structures, Coast Guard research, Oceans, Petroleum, Helicopters, Transport planes, Pumps, Computer programs.
Identifiers: *ADAPTS(Air Deliverable Anti Pollution Transfer Systems), Air deliverable anti pollution transfer systems, Computerized simulation, BAGSIM computer program.

The study was conducted to discover the upper bound on the capability of the system. This allowed the assumptions of good weather, a 20,000 ton tanker cargo in danger of spill in a location where ADAPTS can be delivered, and no machinery or material failures. An adverse condition in any one of these basic assumptions reveals the lower bound of the problem: no bags filled. The actual results will lie between these bounds. For a given set of resources and distances, the manager can determine the upper bound with the model and from that and the extent to which the assumptions are violated he can estimate the actual capability of the system in any given instance. (Author)

AD-732 755/CP PC **A17** MF **A01**
Naval Air Engineering Center Philadelphia Pa Engineering Dept (Si)
Carrier Aircraft Operational Compatibility System (CAOCS - MOD 2) Computer Program
Program development and operation rept. May 70-Mar 71
Eugene P. Lorge, and Paul M. Saia. 20 Oct 71, 399p Rept no. NAEC-ENG-7695

Descriptors: *Operational readiness, Programming(Computers), *Aircraft carriers, Naval aircraft, Computer programs, Take-off, Carrier landings, Weapon systems, Maintenance, Mission profiles, Computer logic.
Identifiers: CAOCS(Carrier Aircraft Operational Compatibility Systems), Carrier aircraft operational compatibility systems, CAOCS-Mod 2 computer program.

The report describes the development and operation of the Carrier Aircraft Operational Compatibility System, Model 2 (CAOCS - MOD 2). As with CAOCS - MOD 1, this computerized system allows a numerical evaluation of naval carrier aircraft in the aircraft carrier environment. The comprehensive evaluation which results is a combination of parameter and criteria definition coupled with a definitive rating system, both of which have been computerized and are evidenced by a hard copy print-out. Mod 2 incorporates modifications to the earlier program, principally involving standardization, which resulted in reductions in computer operating times, storage and core requirements and overall program volume. Contained within this report are descriptions concerning historical development, program philosophies, rating techniques employed and computer program development, operation and maintenance. (Author)

AD-733 676/CP PC **A03** MF **A01**
Naval Ship Research and Development Center Bethesda Md
Small-Perturbation Analysis of Oscillatory Tow-Cable Motion
Final rept.
Keith P. Kerney. Nov 71, 50p Rept no. NSRDC-3430

Descriptors: *Towing cables, Dynamics, Naval research, Computer programs, Perturbation theory, Oscillation, Numerical analysis, Equations of motion.
Identifiers: Computer aided analysis, Kutta Merson method, OMWAY computer program, OMFLO computer program.

The equations of two-dimensional motion of a flexible inextensible cable are linearized by a small-perturbation approximation and sinusoidal time dependence is assumed. The simplified equations are integrated numerically by the Kutta-Merson method. Separate computer programs, OMWAY and OMFLO, have been written for the Quadrant 1 and Quadrant 2 cable-towed-body problems; they are listed in the appendixes.

AD-733 683/CP PC **A05** MF **A01**
Iowa Inst of Hydraulic Research Iowa City
Experimental Procedure for the Determination of Wave Resistance in a Towing Tank
David D. Moran. Aug 71, 85p Rept no. IIHR-133
Contract N00014-68-A-0196-0005

Descriptors: *Hydrodynamics, *Test facilities, *Ship hulls, Drag, Ship models, Instrumentation, Computer programs, Statistical data, Equations of motion, Test methods.
Identifiers: Towing tanks.

The technique, equipment, and experimental procedure presently used at Iowa Institute of Hydraulic Research to obtain a record of the water-surface profile at a fixed point as a ship model is towed past it, is described in detail. The equations and computer programs used to obtain the wave resistance of the ship model from the acquired data are also presented.

AD-735 133/CP PC **A04** MF **A01**
J G Engineering Research Associates Baltimore Md
Far Field Sound Patterns from Anisotropic Cylindrical Shells under Lateral Point Loading at Low Frequencies
Technical rept.
Joshua E. Greenspon. Jul 71, 63p Rept no. TR-ON-18
Contract N00014-71-C-0115
Also includes addendum dated Dec 71.

Descriptors: *Structural shells, Acoustic properties, *Submarine hulls, Underwater sound, *Vibration, Structural shells, Stiffened cylinders, Sandwich construction, Loading(Mechanics), Stresses, Computer programs, Low frequency.
Identifiers: *Cylindrical shells.

The report presents an approximate theory and a computer program for calculating the far field sound radiation patterns from cross stiffened and sandwich cylindrical shells under lateral point loading. The far field radiation patterns are given for a range of low ka. It has been found that a practical structure at low frequencies acts as a dipole and then, as the frequency is increased, transforms into a quadrapole. As the frequency is increased further, the higher lobes come into the picture. (Author)

AD-735 936/CP PC **A04** MF **A01**
California Univ Berkeley Div of Structural Engineering and Structural Mechanics
A Computer Program for Analysis of Stiffened Plates Under Combined Inplane and Lateral Loads
Technical rept.
Dag Kavlie, and Ray W. Clough. Mar 71, 71p Rept no. UCSESM-71-4
Contract N00014-69-A-0200-1045
Continuation of Contract N00014-67-A-0114-0020.

Descriptors: *Ship plates, Mechanical properties, *Programming(Computers), Mechanical properties, Loading(Mechanics), Metal plates, Beams(Structural), Bending, Buckling(Mechanics), Stresses.
Identifiers: Finite element analysis, FORTRAN, FORTRAN 4 programming language, *Stiffened plates.

The finite element method is used as the basis of computer program for analysis of stiffened plates. Triangular and quadrilateral plate elements and beam elements may be used for idealization of the stiffened plates. The plate elements may have isotropic or orthotropic material properties. The stiffeners are assumed to be symmetric about the midplane of the plate. This assumption uncouples the plane stress and the plate bending problems. If the inplane stresses are not known in advance, the plane stress problem can be solved as a first step. The next step may be to solve the plate bending problem. The effect of the membrane stresses on the plate bending behavior is taken care of in this case by adding the geometric stiffness matrix to the elastic stiffness matrix. Alternatively the stability problem may be solved, finding the critical buckling eigenvalue and the corresponding mode shape. A listing of the FORTRAN IV computer program is given in the report, and a few examples of bending and buckling of stiffened plates are presented. The program has been developed and tested on the CDC 6400 computer. (Author)

AD-737 203/CP PC **A09** MF **A01**
Naval Ship Research and Development Center Bethesda Md
Methods for Computing Fluid Loading and the Vibratory Response of Fluid-Loaded Finite Rectangular Plates Subject to Turbulence Excitation--Option 3
Research and development rept.
Ralph C. Leibowitz. Sep 71, 187p Rept no. NSRDC-2976C
See also AD-878 619, AD-718 815 and AD-724 642.

Descriptors: *Ship plates, *Loading(Mechanics), *Computer programs, Turbulence, Hydrodynamics, Digital computers, Numerical analysis, Mathematical models, Flat plate models, Vibration, Acoustic properties, Equations of motion, Naval research.
Identifiers: Fluid loading, Displacement.

Various methods are presented for computing heavy or light fluid loading (i.e., added mass) of thin finite rectangular plates. Based on the results, preferred methods of computation are recommended. These methods and a corresponding computer program are of particular value in extending previously formulated digital computer programs for obtaining the vibroacoustic response to turbulence excitation of a plate. Computer results are given for a particular case involving the effect of fluid loading on the vibratory response of a plate subject to turbulence excitation.

AD-737 999/CP PC **A03**/MF **A01**
Naval Ship Research and Development Center Bethesda Md
Effect of Nonplanar Current Profiles on the Configuration of Moored Cable Systems
Final rept.
Henry T. Wang. Oct 71, 28p Rept no. NSRDC-3692

Descriptors: *Cables(Mechanical), Configuration, Hydrodynamics, Mooring, Differential equations, Motion, Computer programs, Mathematical models.
Identifiers: MR3E computer program, FORTRAN 4 programming language, FORTRAN.

An analysis is presented for the steady-state configuration of an extensible cable system moored in the presence of a current profile which varies both in magnitude and direction with depth. A description is given of the FORTRAN IV computer program based on the above analysis. The program allows for the presence of an arbitrary number of different cables and intermediate bodies. Using this computer program, some numerical results are presented for a cable system with fixed parameters moored in the presence of various current profiles with a single variation of magnitude with depth, but with different variations of direction with depth. These results show that, contrary to what has been stated in the moored cable literature, the planar current profile need not be the worst design case from the standpoint of the cable scope required. (Author)

AD-738 000/CP PC **A03**/MF **A01**
Naval Ship Research and Development Center Bethesda Md
Analysis of the Two-Dimensional Steady-State Behavior of Extensible Free-Floating Cable Systems
Final rept.
Henry T. Wang, and Thomas L. Moran. Oct 71, 31p Rept no. NSRDC-3721

Descriptors: *Cable assemblies, Hydrodynamics, *Buoys, Cable assemblies, Two-dimensional flow, Equations of motion, Computer programs, Mathematical models, Ocean bottom, Ocean currents.
Identifiers: Free floating cable systems.

An analysis is given for the two-dimensional steady-state behavior of extensible free-floating cable systems. The analysis includes the differential equations of equilibrium for an extensible cable and the iteration schemes for the equilibrium system drift velocity and surface buoy draft. Based on this analysis, a FORTRAN IV program, FF2E, has been written. The program allows the cable system to have an arbitrary number of different cable segments and intermediate bodies. The program works well for the large majority of cases of practical interest.

AD-738 435/CP PC **A03**/MF **A01**
Naval Ship Research and Development Center Bethesda Md
Simplified Theoretical Methods of Predicting the Motions of a Catamaran in Waves
Research and development rept.
R. Wahab, and E. N. Hubble. Jan 72, 43p Rept no. NSRDC-3736

Descriptors: *Catamarans, Hydrodynamics, Mathematical prediction, Theory, Ship hulls, Pitch(Motion), Roll, Computer programs, Ocean waves.
Identifiers: Ship motions, Ship motion predictors, Heaving.

Simplified methods are discussed for estimating (1) the pitch and heave of catamarans in head seas based on theory which has proved successful for conventional single hulled ships, and (2) the roll of catamarans in beam seas by representing the small amount of roll as alternate heaving of the two hulls. Both prediction methods neglect interaction effects between the two hulls. Computed values of pitch, heave, and roll are compared with experimental data from model tests of a catamaran in regular waves. Documentation of the computer program for predicting the roll of a catamaran in regular and irregular seas is also presented.

AD-739 328/CP PC **A03**/MF **A01**
Naval Ship Research and Development Center Bethesda Md
Prediction of Three-Dimensional Pressure Distributions of V-Shaped Prismatic Wedges during Impact or Planing
Harry P. Gray, Raymond G. Allen, and Robert R. Jones. Feb 72, 36p Rept no. NSRDC-3795

Descriptors: *Ship hulls, Hydrodynamics, Wedges, Mathematical models, Computer programs, Impact, Prismatic bodies, Equations of motion.
Identifiers: Computer aided analysis, *Slamming impact, Planing.

A computer program has been developed which calculates the water-pressure distribution on V-bottom prismatic wedges during impact or planing. The method of computation is based on previously published semiempirical procedures with several modifications that facilitate programing and result in close correlation to recently published experimental data. The prismatic wedge may have any positive value of trim, deadrise angle, and wetted length. The pressure distribution for the entire hull or any given section of the hull may be calculated in specified increments by using the appropriate input data. Results obtained from the program are in reasonable agreement with certain published experimental planing data. (Author)

AD-740 818/CP PC **A05**/MF **A01**
California Univ Berkeley Coll of Engineering
Experimental and Theoretical Studies of Hull-Deckhouse Interaction - 2-Level Deckhouse
Technical rept.
Johannes Buhler, and Lawrence J. Levy. Aug 71, 78p Rept no. NA-71-4
Contract N00014-67-A-0114-0006, N00024-67-C-5362

Descriptors: *Ship structural components, Interactions, Structural properties, Stresses, Deflection, Computer programs.
Identifiers: Deckhouses, Finite element analysis.

The results of twelve tests of hull-deckhouse interaction are presented and discussed. Deflections of hull and deckhouse were measured. Stress distributions along three transverse sections and along the deck to deckhouse joint were calculated from measured strains. Three bending moment distributions and two deck support arrangements were used in the test program. The experimental results are compared with results from finite element analysis and two other theoretical methods of analysis of hull-deckhouse interaction. (Author)

AD-741 140/CP PC **E01**/MF **A01**
Naval Postgraduate School Monterey Calif
Penetration of Free-Falling Objects Into Deep-Sea Sediments
Master's thesis
Jon William Carlmark. Dec 71, 265

Descriptors: *Salvage, Ocean bottom, *Ocean bottom, Penetration, *Falling bodies, Water impact, Submarines, Ocean bottom topography, Instrumentation, Sedimentation, Free fall models, Mathematical models, Computer programs, Theses.

A rational method is presented to predict the penetration of free-falling objects into deep-sea sediments by combining proven empirical theories from the field of soil mechanics with known hydrodynamic phenomena. The impact velocity of the object and the shear strength profile and density of the sediment are assumed to be known. The penetration problem was solved through the use of a computer by equating the work done during penetration to the energy of the object falling through air and impacting onto a modeled deep-sea sediment. The objects were simple geometric shapes ranging in weight from 500 to more tahn 1,000 pounds. (Author)

AD-742 086/CP PC **A04**/MF **A01**
J G Engineering Research Associates Baltimore Md
Impulsive Response of a Stiffened Plate Mass Loaded Around the Edges
Final rept.
Joshua E. Greenspon. Jan 72, 69p
Contract N00167-71-C-0024

Descriptors: *Ship plates, Loading(Mechanics), *Ship hulls, Underwater explosions, Buckling(Mechanics), Ship structural components, Mathematical models, Elasticity, Oscillation, Metal plates, Computer programs.
Identifiers: Finite difference theory.

The report develops the solution for a cross stiffened plate with mass leading around the edges subject to in impusive loading. Orthotropic plate theory is used to model the stiffened plate. Two solutions are obtained. The first is based upon mode approximations using products of beam functions with edge mass and inertia to represent the modes. The second solution is a finite difference solution. Computer programs and numerical results are given for the first solution. All the necessary equations are set up for the second solution in order to carry out either a modal analysis or a differential equation analysis of a 25 element cross stiffened plate with variable mass and stiffness properties. (Author)

AD-743 055/CP PC **A03**/MF **A01**
Naval Ship Research and Development Center Bethesda Md
Data Generator for the Idealization for Finite Element Structural Analysis of Naval Ship Flat Plated Grillages with Multiple Openings
Research and development rept.
Paul M. Meyer. May 72, 49p Rept no. NSRDC-3807

Descriptors: *Ship structural components, Structural properties, Computer programs, Numerical analysis, Data processing systems, Ship plates, Ship decks.
Identifiers: *Structural analysis, Finite element analysis, DATGEN computer programs, Computer aided design, FORTRAN 4 programming language, FORTRAN.

A computer program was developed for the automatic elementizing of flat-plated ship structural grillages with up to five openings and uniform pressure loads normal to the planar surface. Its purpose is to shorten the preliminary work of preparing data for analysis by the finite element method. The input to the program consists of punched cards which define the plate geometry, and the output consists of a tape which is directly read by the general-purpose finite element program NASTRAN to produce a plot of the user's elementized structure. (Author)

AD-743 069/CP PC **A06**/MF **A01**
Massachusetts Univ Amherst School of Engineering
Laboratory Modelling of Structural Response to Ocean Wave Excitation
Charles A. Clines, and Joseph M. Colonell. Apr 72, 111p Rept no. UM-72-3
Contract N00014-68-A-0146

Descriptors: *Structures, Marine engineering, *Ocean waves, Structures, Test methods, Calibration, Hydraulic models, Computer programs, Sensors, Data processing systems, Simulation, Wind.
Identifiers: Air water interactions, Dynamic structural analysis.

Research on the development of a system to obtain and analyze data pertaining to the response of fixed structures to wind-generated water waves was performed at the University of Massachusetts Wind Wave Research Facility. The report reviews various systems that have been used elsewhere, describes the equipment available at the University of Massachusetts, outlines the systems that were considered, and details the actual system that was developed. Also included are operational procedures for collection and processing of the data and a summary of the results obtained from a series of tests performed with the system on a vertical cylindrical column. (Author)

AD-743 743/CP PC **A06**/MF **A01**
Naval Construction Research Establishment Dunfermline (Scotland)
Three Dimensional Supertanker Computer Programs
Apr 71, 101p NCRE/R.564, NSTIC-30025

Descriptors: *Tankers, Design, *Programming(Computers), Instruction manuals, Structural properties, Mathematical models, Great Britain.
Identifiers: FORTRAN, Computer aided design, Finite element analysis.

A FORTRAN computer program is described for the structural analysis of large tankers, using finite element techniques. The program includes specialised analysis procedures developed at NCRE, which represent the three dimensional structure as an assembly of two dimensional substructures, thereby greatly reducing the cost of the calculation. A data generation program reduces the vast amount of data to be prepared and a special built-in loading program calculates the loading of the structure from the internal fluid levels and the external draught. (Author)

AD-746 460/CP PC **A10**/MF **A01**
Naval Ship Research and Development Center Bethesda Md
Methods for Computing Radiation Damping and the Vibratory Response of Fluid Loaded and Acoustically Radiating Finite Rectangular Plates Subject to Turbulence Excitation - Option 4
Ralph C. Leibowitz. Mar 72, 212p Rept no. NSRDC-2976D

Descriptors: *Ship hulls, Vibration, Damping, Turbulence, Pressure, Excitation, Mathematical models, Computer programs.

Various methods are presented for computing the radiation damping of thin finite rectangular plates immersed in heavy and light fluid media. Based upon the results, preferred methods of computation are recommended. These methods and corresponding computer program--Option 4--are of particular value in extending previously formulated digital computer programs for obtaining the vibroacoustic response to turbulence excitation of a plate. Computer results are given for a particular case including the effect of both radiation damping and fluid loading on the vibratory response of a plate subject to turbulence excitation. (Author)

AD-746 484/CP PC **A04**/MF **A01**
Larock (Bruce E) Davis Calif
Transverse Gravity Effects on a Fully Cavitating Hydrofoil Running Below a Free Surface
Final technical rept. Dec 71-Jul 72
Bruce E. Larock. Jul 72, 73p Rept no. TR-7201
Contract N00014-72-C-0109

Descriptors: *Hydrofoils, Fluid dynamic properties, Cavitation, Lift, Drag, Wake, Gravity, Mathematical models, Computer programs.
Identifiers: Computer aided analysis, FORTRAN 4 programming language, FORTRAN.

Equations are presented which describe the fully cavitating flow of fluid past a flat plate hydrofoil running below a free surface. Transverse gravity field effects are included in the analysis. The equations are developed by the use of complex function theory and Tulin's double-spiral-vortex cavity model. Two FORTRAN 4 computer programs have been developed to evaluate the equations. Features and use of these programs are discussed, and program listings are presented in the appendix. (Author)

AD-746 888/CP PC **A05**/MF **A01**
Newark Coll of Engineering N J Dept of Mechanical Engineering
Optimal Design of Submersible Frame Stiffened, Circular, Cylindrical Hulls
Research rept.
Michael Pappas, and Arnold Allentuch. Jul 72, 94p Rept no. NCE-NV-6
Contract N00014-71-A-0124-0002

Descriptors: *Submarine hulls, Design, Mathematical programming, Computer programs, Algorithms, Optimization, Cylindrical bodies.
Identifiers: Computer aided design, FORTRAN 4 programming language, FORTRAN, SUBSHL computer program.

The report presents the results of a series of optimal design studies of submersible hulls. In this design procedure the designer specifies the design parameters such as the operating depth, hull diameter, hull segment length, hull eccentricity (out-of-roundness), construction material properties, the factors of safety to be used in design, the maximum and minimum values permitted for the design variables, and, when required, a maximum (when external frames are used) or minimum (when internal frames are used) frame diameter. The synthesis procedure selects those values of the design variables, plating, frame web and frame flange thicknesses, frame flange width, and frame spacing that minimize the hull weight/weight displaced ratio while still satisfying all the design equations conventionally used in submersible hull design. (Author)

AD-747 085/CP PC **A04**/MF **A01**
Naval Postgraduate School Monterey Calif
Anchor Cable Dynamics
Master's thesis
Lance Cameron Horne. Jun 72, 55p

Descriptors: *Cables(Mechanical), Hydrodynamics, Equations of motion, Mooring, Anchors(Marine), Drag, Mathematical models, Theses, Computer programs, Integration, Numerical analysis.
Identifiers: Method of characteristics, Numerical integration.

A two dimensional model of an anchor cable subjected to a uniform current, fixed at the sea bed and moving with a specified motion at the surface is developed. A steady state solution is developed and used as an initial condition for the numerical solution of the dynamic equations. (Author)

AD-747 790/CP PC **A04**/MF **A01**
Paulling (J Randolph) Jr Orinda Calif
LODCAP - Recreational Small Boat Live Load Capacity Computer Program
J. Randolph Paulling, Jr. 19 May 72, 69p
Contract DOT-CG-23415-B

Descriptors: *Hulls(Marine), Loading(Mechanics), *Boats, Safety, Load distribution, Coast Guard research, Weight, Planing surfaces, Safety, Control sequences, Computer programs.
Identifiers: *Recreational vessels, Dynamic loads, *Load capacity, Computer aided analysis.

A computer program is described which may be used to determine the maximum load which a craft floating in calm water is capable of supporting. This is accomplished by solving the following problem: 'Given the hull geometry, location of above water hull openings, and initial ship weight and center of gravity position, find the magnitude of the variable weight to be placed in a prescribed location such that the resulting static equilibrium sinkage, trim and heel brings one or more of the hull openings down to, but not below, the water surface.' (Author)

AD-749 962/CP PC **A04**/MF **A01**
Procedyne Corp New Brunswick N J
The Deterministic Evaluation of Ship Motion Impulse Response Functions
Final rept. Jun 71-Mar 72
Richard J. Wheeler, Robert Staffin, and Ronald J. Juels. 20 Mar 72, 51p Rept no. TR-1113-1
Contract N00014-71-C-0398

Descriptors: *Ships, *Hydrodynamics, Ocean waves, Computer programs, Integral transforms, Motion, Fourier analysis, Series, Polynomials.
Identifiers: Computer aided analysis, Fourier transformation, Impulse response functions, Fourier series, *Ship motion, Jacobi functions.

An investigation of the applicability of the Jacobi Function orthogonal polynomial representation of the impulse response function for the determination of ship motion from towing tank tests with irregular waves has been initiated. An analysis of the inverse Fourier transformability of the frequency domain gain and phase information obtained in lieu of time domain impulse response function is given with observations of areas of fallibility and recommendations on circumventive methods.

AD-751 040/CP PC **A03**/MF **A01**
Rensselaer Polytechnic Inst of Connecticut Hartford
Effect of Shell Extensional Vibration on Hull Shock Response
Technical rept. Jun-Sep 72
Rudolph J. Scavuzzo. Sep 72, 26p Rept no. RPI-CONN-2
Contract N00014-71-C-0391
See also AD-745 340.

Descriptors: *Ship structural components, Shock(Mechanics), *Submarine hulls, Vibration, Underwater explosions, Detonation waves, Loading(Mechanics), Structural shells, Kinetic energy, Interactions, Mathematical models, Equations of motion, Computer programs.
Identifiers: Computerized simulation.

The report is an extension of the analysis presented in Report No. 1, AD-751 040. Previously transient hull motions caused by underwater shock were based on the rigid body and flexural modal response of a long elastic ring. Internal equipment structures were modeled as an N-mass system fixed to the inside of the hull at a specified position. The present analysis extends this work by including the response of the first extensional vibration mode. Numerical results are compared with data taken from underwater models. Excellent agreement between calculated and peak hull velocities is obtained. (Author)

AD-752 007/CP PC **A06**/MF **A01**
Naval Postgraduate School Monterey Calif
Automatic Control Systems for Longitudinal Motion of Semisubmerged Ships
Gilbert Finley Monell, Jr. Sep 72, 113p

Descriptors: *Hydrofoil boats, *Adaptive control systems, Ship hulls, Control surfaces, Equations of motion, Hydrofoils, Canard configuration, Hydrodynamics, Mathematical models, Computer programs.
Identifiers: Control theory, Semisubmerged ships, Six degrees of freedom.

Optimal control theory is used to develop three automatic control systems for the longitudinal motion of a semisubmerged ship. A linearized mathematical model of the ship motion is used and the control problem is treated as a linear regulator. Simulations of the ship's longitudinal motions, utilizing the three control systems, are compared for various sea conditions. It is concluded that if the wave forces and moments are known or are estimated as functions of time, a suboptimal controller is the best controller. However, if a frequency domain approach is used to estimate the wave forces and moments, the complexity of a suboptimal controller approaches that of an optimal controller and the difference between the two is negligible. (Author)

AD-752 468/CP PC **A04**/MF **A01**
Oceanics Inc Plainview N Y
Program SCORES - Ship Structural Response in Waves
Final rept.
Alfred I. Raff. Jul 72, 69p SSC-230
Contract N00024-70-C-5076

Descriptors: *Ship hulls, Structural properties, *Computer programs, Instruction manuals, Loading(Mechanics), Hydrodynamics, Ocean waves, Equations of motion, Mathematical models.
Identifiers: SCORES computer program, FORTRAN 4 programming language, FORTRAN, CDC 6600 computers.

Information necessary for the use of the SCORES digital computer program is given. This program calculates both the vertical and lateral plane motions and applied loads of a ship in waves. Strip theory is used and each ship hull cross-section is assumed to be of Lewis form for the purpose of calculating hydrodynamic forces. The ship can be at any heading, relative to the wave direction. Both regular and irregular wave results can be obtained, including short crested seas (directional wave spectrum). All three primary ship hull loadings are computed, i.e. vertical bending, lateral bending and torsional moments. All the basic equations used in the analysis are given, as well as a description of the overall program structure. The input data requirements and format are specified. Sample input and output are shown. The Appendices include a description of the FORTRAN program organization, together with flowcharts and a complete cross-referenced listing of the source language. (Author)

AD-752 742/CP PC **A03**/MF **A01**
Com/Code Corp Alexandria Va
Tanker Transverse Strength Analysis Programmer's Manual
Final rept.
R. Nielsen, P. Y. Chang, and L. C. Deschamps.
Jul 72, 49p SSC-228
Contract N00024-70-C-5219

Descriptors: *Ship hulls, Structural properties, *Computer programs, Instruction manuals, Tankers, Control sequences.
Identifiers: TANKER computer programs, Programming manuals, FORTRAN 4 programming language, FORTRAN, UNIVAC 1108 computers, CDC 6600 computers, Computer aided design, Structural analysis.

The report, the last in a sequence of four Ship Structure Committee Reports on a method for performing structural analysis of a tanker hull, contains the Programmer's Manual for the transverse strength analysis portion of the program. The FORTRAN 4 computer program is written for use on UNIVAC 1108 and CDC 6600 computers. (Author)

AD-752 769/CP PC **A04**/MF **A01**
Com/Code Corp Alexandria Va
Structural Analysis of Longitudinally Framed Ships
Final rept.
R. Nielsen, P. Y. Chang, and L. C. Deschamps.
Jul 72, 67p SSC-225
Contract N00024-70-C-5219

Descriptors: *Ship hulls, Structural properties, *Programming(Computers), Instruction manuals, Tankers, Loading(Mechanics), Force(Mechanics), Stresses, Bending, Buckling(Mechanics), Computer programs.
Identifiers: Finite element analysis, Structural analysis, Computer aided design, FORTRAN 4 programming language, FORTRAN, John A.

The technique of finite elements has brought about a new era to the field of structural analysis of ship structures. The application of this technique, however, is limited by the cost and capacity of the computer. Straight forward applications of the finite element method to the whole or to a major portion of the ship have so far been inaccurate and too expensive for design purposes. The method presented combines the advantages of the finite element technique and the uncoupling by coordinate transformation. A fine mesh may now be used to produce more accurate boundary conditions. The uncoupling transformations also reduce the computer time to about one-tenth of that by other methods. The critical assumptions and the basic theories have been verified with experimental test results from the tanker 'John A. McCone'. Three FORTRAN 4 computer programs are described. They have been written for the UNIVAC 1108 and CDC 6600 computers. (Author)

AD-752 770/CP PC **A02**/MF **A01**
Com/Code Corp Alexandria Va
Tanker Longitudinal Strength Analysis: User's Manual and Computer Program
Final rept.
R. Nielsen, P. Y. Chang, and L. C. Deschamps.
Jul 72, 18p SSC-226
Contract N00024-70-C-5219

Descriptors: *Ship hulls, Structural properties, *Computer programs, Instruction manuals, Tankers, Stresses, Force(Mechanics).
Identifiers: Computer aided design, FORTRAN, LONG computer program, FORTRAN 4 programming language, UNIVAC 1108 computers, CDC 6600 computers.

The report, second in a sequence of four Ship Structure Committee Reports on a method for performing structural analysis of a tanker hull, contains the User's Manual and Computer Program for the longitudinal strength analysis portion of the program. The program is written in FORTRAN 4 for the UNIVAC 1108 and CDC 6600 computers. (Author)

AD-753 223/CP PC **A04**/MF **A01**
Webb Inst of Naval Architecture Glen Cove N Y
Correlation of Model and Full-Scale Results in Predicting Wave Bending Moment Trends
Final rept.
D. Hoffman, J. Williamson, E. V. Lewis, O. J. Karst, and E. G. U. Band. Jul 72, 75p SSC-233
Contract N00024-68-C-5282
Report on Ship Statistics Analyses.

Descriptors: *Ship hulls, Stresses, *Cargo ships, Structural properties, Moments, Mathematical prediction, Model tests, Wind, Response, Bending, Ocean waves, Correlation techniques, Computer programs.
Identifiers: Bending moments, WOLVERINE STATE VESSEL, CALIFORNIA BEAR VESSEL, WTS110 Computer Program.

Comparison is made between model and full-scale predictions of long-term wave-induced bending moment trends for two ships, the S.S. WOLVERINE STATE and the S.S. CALIFORNIA BEAR. For predicting such statistical trends of wave bending moment from model tests two basic types of required data are discussed: Wave data from different levels of sea severity, along with relationships between wave heights and wind speeds, and, Model response amplitude operators as a function of ship loading condition, speed and heading. (Author)

AD-753 462/CP PC **A02**/MF **A01**
Naval Ordnance Lab White Oak Md
A Method of Efficiently Calculating the Temperature Distribution History in Structural Elements Exposed to the Thermal Radiation Pulse of a Nuclear Weapon Explosion
Donald M. Wilson. 10 Aug 72, 5p Rept no. NOLTR-72-177

Descriptors: *Ship structural components, *Nuclear explosion damage, *Naval vessels(Combatant), *Nuclear explosions, Simulation, Airburst, Thermal radiation, Cylindrical bodies, Flat plate models, Mathematical models, Computer programs.
Identifiers: *Temperature distribution.

An efficient, easy to use, and resonably accurate method is given for obtaining the temperature distribution history in elements of shipboard systems which are exposed to the thermal radiation pulse of low altitude nuclear weapon explosions. The method consists basically of interpolating and retrieving temperatures from a generalized data bank of previously-computed temperature histories. In principle, the method could be applied to any element for which sufficient temperature data has been generated. This report discusses its application to four types of elements. These are circular cylinders, flat plates, circular cylinders rotating at 6 rpm and thermally-thin elements. Simple computer programs have been written to aid in the retrieval of the previously computed temperature history for each of these elements and instructions on their use are given. (Author)

AD-753 531/CP PC **E08**/MF **E04**
Hawaii Univ Honolulu
Program 'TRANSHIP' - A Computer Program for the Design of the Midship Section of a Transversely-Framed Dry Cargo Ship. Part II
Final rept.
Manley St. Dec 71, 155p SSC-216
Contract N00024-68-C-5403
Report on Rational Ship Structural Design. See also report dated Oct 70, AD-717 357.

Descriptors: *Cargo ships, Design, *Computer programs, Instruction manuals, Ship hulls.
Identifiers: *Computer aided design, TRANSHIP computer program, FORTRAN.

The report presents the computer program corresponding to the method of design expounded in the Ship Structure Committee Report SSC-215, A Guide for the Synthesis of Ship Structures - Part One - The Midship Hold of a Transversely-Framed, Dry Cargo Ship. The program consists in an executive routine, called TRANSHIP, and twenty seven subroutines. The report includes the complete program documentation. For each routine, the following items are given: description, notation, listing and flow chart. The report includes 64 pages of FORTRAN listings.

AD-754 114/CP PC **A06**/MF **A01**
Massachusetts Univ Amherst School of Engineering
Calculation of Inlet Flows by Means of a Closed Vorticity Distribution Applied to Ducted Propellers
Ronald J. Weetman, and Duane E. Cromack.
Dec 72, 106p Rept no. UM-72-11
Contract N00014-68-A-0146

Descriptors: *Propellers(Marine), Flow fields, *Propellers(Aerial), Flow fields, Shrouded propellers, Shroud rings, Marine propulsion, Vertical take-off planes, Vortices, Duct inlets, Mathematical models, Computer programs.
Identifiers: Computer aided analysis.

The investigation concerns inlet flow calculations applied to ducted propellers. The analysis is classified as that of an inlet flow since the ducted propeller wake is assumed to be at a constant diameter. A closed distribution of ring vortices is used to describe the duct and wake. By forming a closed distribution, the velocity can be equated directly to the vorticity. With this representation, singular integral equation of the first kind is formulated for the vorticity in terms of the streamline enclosing the duct and wake. Several techniques incorporated in the numerical solution of this integral equation are presented. This analysis provides a needed solution for ducted propellers operating at low speeds and statically, as well as at high speeds. (Author)

AD-754 822/CP PC **A05**/MF **A01**
General American Transportation Corp Niles Ill General American Research Div
Application of Cycloidal Cam Type Speed Reducers to Marine Gas Turbine Engines
Final rept. Mar-Jun 72
Veljko Milenkovic, and Thomas H. Sytko. Jun 72, 93p*
Contract N00014-72-C-0178

Descriptors: *Speed regulators, Performance(Engineering), *Marine surface propulsion, *Gas turbines, Transmissions, Cams,

Crankshafts, Design, Shear stresses, Mathematical models, Computer programs.
Identifiers: Cycloidal cam speed reducers, Design criteria, Horsepower.

The report covers the results obtained during the period March 1972 to June 1972 on a study program of cycloidal cam type transmissions. The objective was to provide design criteria for determining the maximum horsepower that can be transmitted using a cycloidal cam transmission for reduction ratios from 10:1 to 100:1 and input speeds from 500 to 12,500 RPM with a service life of 30,000 hours. From the analysis uncovered in the literature and that developed by GARD personnel a computer program was developed to optimize the cycloidal cam type transmission and analyze the stresses on the load carrying members. Contact stresses at the input crank shaft, reaction rollers and reverter pins were computed. Design limitations were assumed to be a rolling element contact fatigue stress limit of 200,000 psi, a roller bearing DN value of 1,300,000 and a maximum crankshaft shear stress of 50,000 spi. All transmission elements were assumed to be steel. (Author)

AD-756 547/CP PC **A06**/MF **A01**
Naval Postgraduate School Monterey Calif
Forces on a Horizontal Cylinder Due to Non-Linear Waves
Master's thesis
Fred Herman Gehrman, Jr. Dec 72, 107p

Descriptors: *Underwater objects, Loading(Mechanics), Cylindrical bodies, Ocean waves, Force(Mechanics), Experimental design, Test equipment, Computer programs, Theses, Nonlinear systems.
Identifiers: *Underwater structures, Gravity waves, Internal waves.

A horizontal cylinder, located near the floor of a two dimensional wave channel was subjected to a train of non-linear gravity waves. The horizontal and vertical forces were measured and presented in dimensionless form. Experimental values of horizontal and vertical force coefficients are presented as functions of dimensionless wave height and dimensionless wave period. The dimensionless force coefficients predicted by a modified Morrison equation and a Froude-Krilov force are compared to experimental data. Fluid particle velocity and acceleration values were calculated from Stokes fifth-order gravity wave theory. Experimental dimensionless wave periods from 10 to 200 were investigated. (Author)

AD-756 548/CP PC **A06**/MF **A01**
Naval Postgraduate School Monterey Calif
Maneuvering Control of Replenishment at Sea
Master's thesis
Theodoros Sarzetakis. Sep 72, 111p

Descriptors: *Tankers, *Refueling, *Naval vessels(Combatant), *Logistics, Marine rudders, Maneuverability, Stability, Transfer functions, Mathematical models, Computer programs, Theses.
Identifiers: *Replenishment at sea, Stationkeeping, Computer aided analysis, Feedback control.

An investigation of the maneuvering control of ships involved in the replenishment at sea operation under calm water conditions is carried out. The linearized differential equations of motion of a vessel in the horizontal plane are established and implemented for the formation of computer programs, useful for the study of the behavior and stability of the ship with and without the influence of control surfaces (rudders). Three methods of controlling automatically the maneuvering of two ships, in replenishment at sea, under the influence of interactive forces and moments, based on the classical feedback control theory are presented, compared and conclusions are finally drown about the efficiency of these methods. (Author)

AD-757 175/CP PC **A03**/MF **A01**
Coast Guard Washington D C Applied Technology Div
Preliminary Analysis of Tanker Collisions and Groundings
Technical rept. Aug-Nov 70
David M. Bovet. Jan 73, 48p*

Descriptors: *Ships, *Accidents, *Tankers, Accidents, Computer programs, Analysis, Penetration, Velocity, Damage, Harbors, Momentum, Energy.
Identifiers: *Collision research, *Oil pollution control, Water pollution abatement, FORTRAN, Design criteria, CG.

The report presents the results of a preliminary analysis of tanker collision and grounding data. Collisions are analyzed in terms of vessel size, vessel speed at time of occurrence, angle of collision, depth of penetration, and geographical location of collision. Correlations of penetration depth with striking ship speed, momentum, and energy are attempted. A brief analysis of tanker groundings is presented. Witin the small sample of events available for collisions and groundings, certain preliminary trends and conclusions relating to pollution control through ship design are drawn. (Author)

AD-758 431/CP PC **A13**/MF **A01**
General Electric Co Schenectady N Y Research and Development Center
Cryogenic Systems and Superconductive Power
Semiannual technical rept. no. 1, 1 Jun-30 Nov 72
B. D. Hatch, R. B. Fleming, D. W. Jones, S. H. Minnich, and D. L. Kerr. 20 Dec 72, 296p Rept no. SRD-73-022
Contract DAHC15-72-C-0235, ARPA Order-2200

Descriptors: *Marine propulsion, Cryogenics, *Refrigeration systems, Gas turbines, Refrigerant compressors, Heat exchangers, Magnetohydrodynamic generators, Systems engineering, Computer programs, Superconductivity.
Identifiers: *Turborefrigerators, *Turbomachinery, Turboalternators, A.

The specific objectives of this program are the following: Conduct a limited but broad application survey of multiple applications in which the use of cryogenic and superconductive systems and components offer substantial advantages through improvements in the performance of propulsion, communication, detection or weapons systems; Define, investigate, and experimentally evaluate the key elements of a representative cryogenic turborefrigerator subsystem suitable for providing reliable long-lived cryogenic refrigeration for a superconductive ship propulsion system; and, Provide a sound technical basis for subsequent applications of superconductive power in the area of ship propulsion. (Author Modified Abstract)

AD-761 159/CP PC **A05**/MF **A01**
Logistics Management Inst Washington D C
Assessment of Patrol Frigate Maintenance Policy. Computer Simulation of a Rotatable Pool for the PF
Mar 73, 87p Rept no. LMI-72-15-Mar 73
Contract SD-271
See also report dated Aug 72, AD-761 158.

Descriptors: *Frigates, Maintenance, Destroyers, Logistics, Maintainability, Spare parts, Time studies, Management planning, Advanced planning, Computer programs.
Identifiers: Patrol frigates, *Intermediate maintenance, *Logistics management, Rotatable pools, Computerized simulation, SD.

A computer simulation has been written which is useful for describing the use of a rotatable pool of spare items to supply a fleet of independently operating vehicles. The spare items may be installed at up to three levels of maintenance, while the ships operate on a fixed schedule moving between the three levels. The levels of maintenance are: Organizational, Intermediate, and Depot. The items may come ashore to be repaired when the vehicle is at the deport level only, or at both the intermediate and depot levels. Similarly, spare items may replace failed items at all three levels (when spares are carried), at the intermediate and depot levels, or at the depot level only. When failed items come ashore they are repaired and enter a pool, waiting to replace a failed item. (Modified author abstract)

AD-761 164/CP PC **A06**/MF **A01**
Woods Hole Oceanographic Institution Mass
Computer Programs for the Static Analysis of Single Point Moored Surface and Subsurface Buoy Systems
Technical rept.
H. O. Berteaux, and N. K. Chhabra. Mar 73, 120p
Rept no. WHOI-73-22
Contract N00014-66-C-0241

Descriptors: *Mooring buoys, Cables(Mechanical), *Cables(Mechanical), Mechanical properties, Force(Mechanics), Loading(Mechanics), Hydrodynamics, Stresses, Strain(Mechanics), Design, Tensile properties, Computer programs.
Identifiers: *Moorings, Statics, Sigma 7 computers, N.

The report presents two computer solutions for predicting the equilibrium configuration of single point moored surface and subsurface buoy systems set in planar flow. The method of solution presented by W. D. Martin (1968) has been expanded to account for more complex surface systems and to include subsurface cases. The first section of the report is an introduction to the theoretical concepts and assumptions considered by the computer solutions. The second section outlines in detail the integration and iteration procedures and the programs' logic. The introduction of actual physical parameters is reviewed in the next section. The last section gives a detailed set of instructions for the program users, reviews the programs capabilities and limitations, and presents a number of case studies. The programs are written for use with XEROX SIGMA 7 computers. Complete listings for the two programs are given in the appendix. (Author)

AD-761 643/CP PC **A05**/MF **A01**
Newark Coll of Engineering N J Dept of Mechanical Engineering
Optimal Design of Submersible Frame Stiffened, Circular Cylindrical Hulls
Michael Pappas, and Arnold Allentuch. Jul 72, 89p Rept no. NCE-NV-6
Contract N00014-71-A-0124-0002
Supersedes report dated Jul 72, AD-746 888.

Descriptors: *Submarine hulls, Design, Stiffened cylinders, Optimization, Computer programs, Algorithms, Mathematical programming.
Identifiers: Computer aided design, FORTRAN 4 programming language, FORTRAN, SUBSHL computer program, N.

The report presents the results of a series of optimal hull design studies performed using an automated optimum design capability program and procedures. The procedures generate the optimal design of a submersible, 'T' frame stiffened, circular, cylindrical hull segment.

AD-763 400/CP PC **A05**/MF **A01**
Newark Coll of Engineering N J Dept of Mechanical Engineering
Structural Synthesis of Frame Reinforced Submersible, Circular, Cylindrical Hulls
Michael Pappas, and Arnold Allentuch. May 72, 91p* Rept no. NCE-NV-5
Contract N00014-71-A-0124-0002
Errata sheet inserted. Prepared in cooperation with the Foundation for the Advancement of Graduate Study in Engineering.

Descriptors: *Hulls(Marine), Design, *Underwater vehicles, Structural shells, Cylindrical bodies, Pressure vessels, Reinforcing materials, Buckling(Mechanics), Mathematical programming, Computer programs, Hydrostatic pressure.
Identifiers: Computer aided design, Cylindrical hulls, *Structural design, N.

The report describes an automated computer synthesis capability for the preliminary design of circular, cylindrical, 'T' frame, stiffened hulls subject to hydrostatic pressure.

AD-763 465/CP PC **A05**/MF **A01**
California Inst of Tech Pasadena Div of Engineering and Applied Science
Numerical Computations of Supercavitating Hydrofoils on Parabolic Shape with Wu and Wang's Exact Method
Okitsugu Furuya. Jan 73, 84p Rept no. E79A.15
Contract N00014-67-A-0094-0021

Descriptors: *Hydrofoils, Fluid dynamic properties, Incompressible flow, Parabolic bodies, Cavitation, Fluid flow, Mathematical models, Computer programs.
Identifiers: *Supercavitating hydrofoils, N.

Wu and Wang in 1963 proposed a method to solve a system of nonlinear integral equations obtained to determine the supercavitating (s/c) flow past arbitrary hydrofoil shapes in which a functional iterative method was used. The application of the method is presently concerned with arbitrary-shaped s/c hydrofoils, especially with those having rounded leading edges, since there have been no such successful results up to date. The rounded nosed body in the present paper was a parabolic strut and the position of the upper cavity separation point and the body thickness were changed in several ways while the cavitation number was fixed to be zero throughout the investigation. (Modified author abstract)

AD-764 085/CP PC **A04**/MF **A01**
Notre Dame Univ Ind Coll of Engineering
Inelastic Buckling of a Deep Spherical Shell Subject to External Pressure
Technical rept.
N. C. Huang, and G. Funk. Jul 73, 69p Rept no. UND-73-7
Contract N00014-68-A-0152

Descriptors: *Structural shells, Buckling(Mechanics), *Underwater vehicles, Hydrostatic pressure, Spheres, Ship hulls, Stresses, Pressure vessels, Creep, Deformation, Mathematical models, Computer programs.
Identifiers: Finite difference theory, Bifurcation theory, *Spherical shells, N.

The report is concerned with the investigation of the inelastic buckling of a deep spherical shell subject to a uniformly distributed external pressure. The geometry of the shell is considered to be axisymmetrical while the shell thickness may vary as a function of the polar angle. The edge of the shell is supported elastically. The material of the shell is assumed to satisfy the generalized Ramberg-Osgood stress-strain relations and a power law of steady creep. The analysis is based on Sanders' nonlinear theory of thin shells expressed in an incremental form and Hill's theory of inelastic bifurcation. Computations are carried out by a numerical iterative procedure associated with a finite difference method. Solutions are sought for both the axisymmetrical inelastic buckling and the asymmetrical bifurcation. (Author)

AD-764 299/CP PC **E08**/MF **A01**
Naval Ship Research and Development Center Bethesda Md
Proceedings of the Navy-NASTRAN Colloquium (3rd) Held at Naval Ship Research and Development Center, Washington, D.C., 22-23 Mar 72
23 Mar 72, 228p

Descriptors: *Programming(Computers), Structural properties, Symposia, Structural parts, Structural shells, Ship structural components, Spacecraft components, Roofs, Concrete, Composite materials, Laminates, Proximity fuzes, Torpedoes, Wings.
Identifiers: *NASTRAN computer program, *Structural analysis, Dynamic structural analysis, Static structural analysis, Finite element analysis, CDC 6700 computers, FORTRAN, IBM 360 computers, UNIVAC 1108 computer, BANDIT computer program, N.

The 3rd Navy-NASTRAN Colloquium served as an effective forum for an exchange of information and experience among structural analysts in general and NASTRAN users in particular. Twenty-six papers were presented at the Colloquium dealing with various aspects of structural analysis by computer. Fifteen papers are included here in full; eleven are published in abstract form. Most of the abstracts refer either to an already published report or to a pending publication.

AD-764 480/CP PC **A04**/MF **A01**
Naval Postgraduate School Monterey Calif
Ditigal Computer Simulation for Surface Ship Control
Master's thesis
Aporm Ratanaruang. Jun 73, 66p

Descriptors: *Ships, Motion, Equations of motion, Roll, Pitch(Motion), Yaw, Mathematical models, Computer programs, Theses, Marine surface propulsion.
Identifiers: Digital simulation, Six degrees of freedom, N.

The general equations of surface ship motion are developed and standardized for simulation in digital computer. Digital simulations of the dynamics of the surface ship in three degrees of freedom are done with and without non-linear and cross-coupling terms. (Author)

AD-764 865/2CP PC **A10**/MF **A01**
Cadcom Inc Annapolis Md
Simulation of the Compatibility of an Air Capable Ship and a VTOL Aircraft
Final rept. 16 Jun 72-Mar 73
George H. Daffer, and David F. Rogers. Mar 73, 207p Rept no. CADCOM-73-6
Contract N00014-72-C-0531

Descriptors: *Vertical take-off planes, Aeronautics, *Naval vessels(Combatant), Vertical take-off planes, Ocean waves, Pitch(Motion), Flight control systems, Angle of attack, Equations of motion, Mathematical models, Computer programs.
Identifiers: LARC 1 computer program, *SEa control ships, Seakeeping, Harrier aircraft, H-53 aircraft, CH-53 aircraft, Computerized simulation, N.

An interactive computer simulation, LARC-I, has been designed to solve the non-linear equations of motion of a generalized VTOL aircraft taking off from or landing on the deck of a ship moving in an irregular or random seaway. This version of LARC-I is limited to longitudinal motions, but is designed for eventual expansion to all degrees of freedom. The LARC-I programs makes use of ship motion amplitudes and frequencies derived separately in a ship motions program, wherein the forcing functions of the seaway are based on a stochastic representation of the waves for any given sea state. The pitching and heaving motions of the ship are transmitted to the aircraft by a realistic simulation of the landing gear. (Modified author abstract)

AD-765 712/5CP PC **A06**/MF **A01**
Naval Ship Research and Development Center Bethesda Md
Stress Analysis of Complex Ship Components by a Numerical Procedure Using Curved Finite Elements
Final rept.
James Hsienne Ma. Jul 73, 103p* Rept no. NSRDC-4057

Descriptors: *Propellers(Marine), Stresses, Structural properties, Numerical analysis, Loading(Mechanics), Hydrostatic pressure, Computer programs, Propeller blades.
Identifiers: Finite element analysis, Structural analysis, Stress analysis, Static structural analysis, FORTRAN, N.

A numerical procedure for the structural analysis of a general three-dimensional nature has been developed to provide a reliable solution to the problem of determining the strength of propellers, particularly those with unconventional configurations. A finite element displacement model is used and compatible solid elements in their general form are adopted. The use of interpolation functions to define pertinent curvilinear coordinates in element space gives the finite element technique, new capabilities for dealing with structures of highly complex geometry. This formulation bypasses the constraints of simplifying assumptions (such as those imposed by classical plate theory) and allows a closer approximation to the true structural configuration than is possible by other approaches, including most analytical and numerical methods. The performance of the refined elements described in this report is distinctly superior to those obtainable with commonly available elements, for example, those in NASTRAN. A highly skewed propeller blade under prescribed pressure distributions was chosen for demonstration of the generality of the procedure. Good agreement was obtained with measured displacement and experimental stress data. (Author)

AD-767 046/6CP PC **A04**/MF **A01**
Massachusetts Univ Amherst School of Engineering
Experimental Determination of Strain Concentrations near an Unreinforced Hole in Orthotropic Shells
Charles F. Scribner, and William A. Nash. Jul 73, 60p Rept no. UM-73-7
Contract N00014-68-A-0146-0016

Descriptors: *Reinforced plastics, Stresses, *Structural shells, Composite materials, Underwater vehicles, Loading(Mechanics), Epoxy plastics, Glass textiles, Strain(Mechanics), Mathematical models, Computer programs.
Identifiers: Openings, Cylindrical shells, Stress concentration, Computer aided analysis, N.

Research was conducted in the University of Massachusetts Structural Mechanics Laboratory to determine the character of stress concentrations around an unreinforced hole in cylindrical orthotropic shell sections. The report discusses construction and instrumentation of these sections with consideration of various systems of strain measurement, described the equipment used in tests, and discusses the data obtained from strain gages epoxied to the surface of three specimens. Qualitative conclusions are drawn relating the behavior of this material to the behavior of isotropic materials and a similar glass-reinforced material with different fiber orientation. (Author)

AD-767 309/8CP PC **A05**/MF **A01**
Naval Research Lab Washington D C
A Fortran IV Program for Computing the Static Deflections of Structural Cable
Final rept.
Richard A. Skop, and James Mark. 31 Aug 73, 96p* Rept no. NRL-7640

Descriptors: *Cables(Mechanical), Deflection, *Underwater objects, *Mooring, *Computer programs, Instruction manuals, Ocean currents, Anchors(Marine), Underwater equipment, Configuration.
Identifiers: FORTRAN, FORTRAN 4 computer language, DESADE computer program, N.

DESADE is a Fortran 4 program for computing the current-induced static deflections of Structural Cable Arrays. As dimensioned, the program can handle arbitrarily configured arrays of up to 22 cables. The cables can be electromechanical wire rope, or synthetic. Any number of discrete devices (buoyancy elements, current meters, tensiometers, etc.) can be incorporated in the array. An option for parametric studies is included in the program, as is an option for incorporating arbitrary current fields. As written, DESADE should compile on most Fortran 4 compilers with Boolean algebra capabilities. (Author) Portions of this report are not fully legible.

AD-767 330/4CP PC **A04**/MF **A01**
Arizona Univ Tucson Dept of Aerospace and Mechanical Engineering
A Graphics Oriented Interactive Finite Element Time Sharing Package (GIFTS)
H. A. Kamel, and M. W. McCabe. 25 Jul 73, 72p
Contract N00014-67-A-0209-0016

Descriptors: *Structural properties, *Programming(Computers), *Ships, Design, Data processing systems, Time sharing, Graphics, Matrix algebra, Curve fitting.

Identifiers: Finite element analysis, GIFTS system, Naval architecture, Structural analysis, Interactive computer programs, Stiffness methods, N.

The report describes a general purpose analysis package (GIFTS) (Graphics oriented Integrated Finite element Time Sharing package) aimed primarily at ship structure design using the finite element method on a time-sharing system. Although the project was started with ship structures in mind, the concept has developed in such a manner as to offer a solution to other problems related to finite element analysis. The end product should provide a nationwide communication system between users enabling them to exchange data, results and programs with relative ease. The system acknowledges and uses some of the latest developments in computer technology, namely, time-sharing, inexpensive graphics terminals, and computer networks. It also may be used advantageously with mini-computers.

AD-767 428/6CP PC A04/MF **A01**
Paulling (J Randolph) Jr Orinda Calif
FLSTAB: Recreational Small Boat Flooded Stability Program
Computer program and manual
J. Randolph Paulling, Jr. Oct 72, 55p USCG-735101
Contract DOT-CG-23415-B

Descriptors: *Boats, Buoyancy, *Hydrostatics, *Computer programs, Floatation, Hulls(Marine), Bulkheads, Stability.
Identifiers: FLSTAB computer program, FORTRAN 4 programming language, FORTRAN, CG.

A computer program is described which may be used to determine the equilibrium attitude of flotation and stability of a craft afloat in calm water with its interior volume flooded in free communication with the outside. The intact, buoyant portion of the craft comprises the thickness of its hull material plus other specific intact volumes. These are described either by giving a description of a series of transverse sections through each intact volume, or by describing horizontal, transverse, and longitudinal planes which form their boundaries. Several intact volumes of each type may be present and each may be partly permeable. The initial condition is described by giving the weight and center of gravity location of each of a group of items which make up the total weight of the craft and its contents. Output of the program consists of the intact drafts and heel angle, the flooded equilibrium position, and a table of righting arms versus heel angles in the flooded condition. (Author)

AD-767 675/2CP PC E05/MF **A01**
Naval Postgraduate School Monterey Calif
Factors Influencing Ship Repair Part Consumption
Master's thesis
Richard Alan Lippert, and William Thomas Lee. Sep 73, 116p

Descriptors: *Spare parts, Inventory analysis, *Ships, Maintenance, Fuel consumption, Naval vessels(Combatant), Naval vessels(Support), Ocean models, Ship models, Mathematical models, Costs, Computer programs, Theses, Naval equipment.
Identifiers: 3M system, N.

An investigation was made of possible linear relationships between several specific factors concerning ships of the Navy and the actual repair part consumption dollar figures for a two year period for the purpose of using such relationships for planning and budgetary aids. Factors considered included steaming hours, fuel consumption, overhaul schedules and overhaul mandays, and ship age. Overall Navy-wide linear models were developed for NSA (odd cog) stock numbered items, for APA (even cog) stock numbered items, for Other (odd cog) manufacturer's part-numbered items (items without a Federal Stock Number assigned), and for a combined overall repair part model. In addition, some of the same models were developed for the Pacific and Atlantic fleets and for certain ship types. (Author)

AD-767 680/2CP PC **E06**/MF **A01**
Naval Postgraduate School Monterey Calif
Turning Characteristics of the Bell 100 Ton Surface Effect Ship
Master's thesis
Kenneth Randall Myers. Jun 73, 145p

Descriptors: *Ground effect machines, Maneuverability, *Ships, Ground effect, Marine surface propulsion, Ocean waves, Marine rudders, Equations of motion, Mathematical models, Computer programs, Theses.
Identifiers: *Captured air bubble ships, Computer aided analysis, Computerized simulation, N.

The turning characteristics of the Bell 100 ton captured Air Bubble Surface Effect Ship (CAB/SES) are studied with the aid of the Oceanic Incorporated computer simulation. The craft's motions for straight runs, straight runs with waves and turning runs under calm water conditions, are compared with the final set of computer simulation turning maneuvers with waves involving changing speeds, wavelengths, wave amplitudes, and final rudder angles. (Author)

AD-768 021/8CP PC E04/MF **A01**
Newark Coll of Engineering N J Dept of Mechanical Engineering
Extended Structural Synthesis Capability for Automated Design of Frame-Stiffened, Submersible, Circular, Cylindrical Shells
Michael Pappas, and Arnold Allentuch. Jun 73, 95p Rept no. NCE-NV-8
Contract N00014-71-A-0124-0002

Descriptors: *Stiffened cylinders, Design, *Structural shells, Underwater, Cylindrical bodies, Loading(Mechanics), Hydrostatic pressure, Bulkheads, Mathematical models, Computer programs.
Identifiers: Computer aided design, Cylindrical shells, N.

The report presents a procedure and computer program for the minimum weight design of circular, cylindrical, 'T' frame (ring) reinforced, submersible shells where all metal thicknesses may be confined to specified gage thickness values. Using the designer specified parameters defining shell radius, shell length, eccentricity, operating depth, design factors of safety, construction materials properties, and, when used, the specified gage thickness values, the program will generate those values of skin thickness, stiffener web and flange thicknesses, stiffener web depth and flange width, and if desired, stiffner spacing that will produce the smallest shell weight to liquid weight displaced ratio. Design equations control general, shell (skin) and stiffener instability, and skin and stiffener yielding. (Modified author abstract)

AD-768 319/6CP PC **A04**/MF **A01**
Hydrospace-Challenger Inc Rockville Md
The Configuration and Loading of a Torisonally Elastic Faired Cable
Final rept.
David B. Dillon. Oct 73, 59p Rept no. HCI-TR-4557-0001
Contract N00014-70-C-0040

Descriptors: *Cable fairings, Loading(Mechanics), *Towing cables, Configuration, *Cables(Mechanical), Mathematical models, Hydrodynamic configurations, Force(Mechanics), Torsion, Stability, Computer programs.
Identifiers: Computer aided design, BASIC programming language, TWIST computer program, N.

A mathematical model for the equilibrium configuration and tension for a flexible, faired cable with torsional elasticity in a uniform stream is presented. The differential equations are derived and a numerical integrating program for solving the initial value problem thus posed is given in the BASIC computer language. A sample problem is solved and discussed. (Author)

AD-768 368/3CP PC A03/MF **A01**
Newark Coll of Engineering N J Dept of Mechanical Engineering
Pressure Hull Optimization Using General Instability Equations Admitting More than One Longitudinal Buckling Half-Wave
Michael Pappas, and Arnold Allentuch. Jun 73, 42p Rept no. NCE-NV-9
Contract N00014-71-A-0124-0002

Descriptors: *Pressure vessels, Buckling(Mechanics), Optimization, Design, Stiffened cylinders, Hulls(Marine), Pressure, Mathematical models, Computer programs.
Identifiers: Computer aided design, Computerized simulation, N.

An improved method for predicting general instability admitting more than one longitudinal half-wave is adapted to an automated optimal design precedure described in NCE Reports NV5 and NV6. The original procedure assumes that the critical buckling shape contains only one longitudinal half-wave. This assumption is incorrect when ultra-high strength steels are used if what appears to be a questionable independent frame buckling constraint, used in the original design procedure, is relaxed. Design studies demonstrate that substantial weight benefits are possible at conventional operating depths (around 1,000 feet) if ultra-high strength steels are utilized and the new design equations are employed. Little weight improvement results from the use of high strength steels using the original design procedure. (Author)

AD-768 863/3CP PC A06/MF **A01**
Teledyne Materials Research Waltham Mass
Computer Programs for the Digitizing and Using of Library Tapes of Ship Stress and Environment Data
Final rept.
Aldie E. Johnson, Jr, James A. Flaherty, and Isaac J. Walters. Feb 73, 115p* E-1149(d), SSC-237
Contract N00024-69-C-5161

Descriptors: *Cargo ships, Stresses, *Stresses, *Computer programs, Analog-digital computers, Magnetic tape, Control sequences, Instruction manuals, Statistical analysis.
Identifiers: Stress analysis, N.

Processor programs are given to convert original analogue stress data and hand-entry ship, sea and weather environmental information to a final digital format. Included is a program to provide a capability to retrieve portions of the data for subsequent statistical analysis. (Author)

AD-768 911/0CP PC A04/MF **A01**
Nielsen Engineering and Research Inc Mountain View Calif
Theoretical Analysis of Cycloidal Propellers. Part II. Program Manual
Final rept. 1 May 70-30 Jun 73
Michael R. Mendenhall, and S. B. Spangler. 30 Jun 73, 58p Rept no. NEAR-TR-53-Pt-2
Contract N00014-70-C-0346
See also report dated 30 Jun 73, AD-768 910.

Descriptors: *Cycloidal propellers, Performance(Engineering), *Computer programs, Instruction manuals, Propellers(Marine), Blade airfoils, Camber, Wake, Vortices, Cavitation, Mathematical models, Two-dimensional flow.
Identifiers: FORTRAN 4 programming language, FORTRAN, CDC-6600 computers, N.

A computer program has been developed to predict the behavior and performance of a cycloidal propeller assuming two-dimensional flow. Potential flow methods are used and the wake vorticity shed from each blade is approximated by a number of discrete vortices. The interference of the wake on the blades, the blades on the wake, and mutual interference between the blades are considered. The report is a user's manual for the computer program. This program manual contains a description of the use of the program, instructions for preparation of input, a description of the output, a program listing, and sample cases. The theory and comparisons with three-dimensional data are described in Part I of this report. (Author)

AD-769 872/3CP PC **E07**/MF **A01**
Wyle Labs Huntsville Ala
Recreational Boat Developmental Test Program Developmental Testing. Volume II. Tests, Methods and Reports
Final rept.
J. O. Bowman, and R. W. White. Oct 73, 187p
Rept no. MSR-73-12
Contract DOT-CG-12377-A

Descriptors: *Boats, Test methods, Checkout equipment, Checkout procedures, Construction, Instrumentation, Safety devices, Stability, Standards, Recreation, Computer programs.
Identifiers: *Recreational boating, CG.

The report is Volume 2 of a three volume report. The report presents recreational boat safety tests and methods. The tests include those necessary to document the boat under test; hull identification number, physical measurements, capacities (loading, flotation, powering), fire and explosion systems (fuel, electrical and ventilation), and other boat appurtenances. Certain tests are presented which are intended to obtain data toward future standards or to upgrade existing standards in powering, flotation, loading and small boat stability. An instrumentation manual for small boat dynamics measurements is included along with descriptions of data handling methods. Finally, the methods and procedures needed to accumulate data and information into a set of standards files in the various areas of boating safety are defined. (Author)

AD-770 330/9CP PC **A08**/MF **A01**
Coast Guard Washington D C
Development of a Time Domain Simulation for Ship Capsizing in following Waves
Final rept.
David M. Bovet. Oct 73, 161p Rept no. USCG-D-28-74

Descriptors: *Ships, *Ocean waves, *Ship motion, Ship models, Computerized simulation, Stability, Ship hulls, Degrees of freedom, Computer programs.
Identifiers: *Capsizing, CG.

The report describes the development of a time domain computer simulation for ship capsizing in following waves. A survey of the recent literature in this field is presented. The formmulation of the present approach is discussed, along with computer program limitations and assumptions. The program developed is used to study the phenomenon of low cycle roll resonance as demonstrated by a two-dimensional section in forced heave motion and by a fast cargo liner in following waves, both regular and irregular. (Modified author abstract)

AD-770 618/7CP PC **A03**/MF **A01**
Naval Ship Research and Development Center Bethesda Md
SOLVEDG, An Out-of-Core System Solver for Large Order Positive Definite Systems of Linear Equations
Donald A. Gignac. Aug 73, 36p Rept no. NSRDC-4235

Descriptors: *Ships, *Structural properties, *Computer applications, Computer programs, Algorithms, FORTRAN, Computations, Matrices(Mathematics).
Identifiers: *Static structural analysis, SOLVEDG computer program, Finite element analysis, N.

In the finite element approach to static structural analysis, the solution of the equation KU = P a positive definite system of simultaneous linear equations is basic. However, the order of K is often so large that, when advantage is taken of K's symmetry and banded structure, it is not feasible or sometimes even possible to store K in the core memory of a computer. SOLVEDG is an out-of-core system solver for KU = P suggested by Cantin's IBM 360 program SOLVE. SETUP is a preprocessor program for SOLVEDG which stores the matrices K and P in Random Access Files. SOLVEDG and SETUP are written in FORTRAN Extended for the CDC 6700 (6400/6600). The report also contains an original proof justifying the basic algorithm of SOLVEDG. (Author)

AD-771 367/0CP PC **E05**/MF **A01**
Draper (Charles Stark) Lab Inc Cambridge Mass
Mooring Mechanics - A Comprehensive Computer Study. Volume I. Three Dimensional Static Analysis and Design of Single Point Taut and Slack Moored Buoy Systems. Part I. Surface Mooring Lines. Part II. Subsurface Mooring Lines
Final rept.
Narender K. Chhabra. Nov 73, 132p Rept no. R-775
Contract N00014-67-A-0204-0047

Descriptors: *Mooring buoys, *Mooring, *Mechanical cables, Computerized simulation, FORTRAN, Computer programs, Statics.
Identifiers: *Mooring lines, Design, IBM 360/75 computers, Computer aided design, N.

Part I of the report deals mainly with the static case of a single point surface mooring line, and presents a computer solution to provide, with reasonable accuracy, the system's steady-state configuration with regard to geometry and line tension. The computer program presented is written in FORTRAN. A complete listing and detailed instructions for its use are included. Part II deals mainly with the static case of a single point subsurface mooring line, and presents a computer solution to provide, with reasonable accuracy, the system's steady-state configuration with regard to geometry and line tension. (Modified author abstract)

AD-771 448/8CP PC **E02**/MF **A01**
Auburn Univ Ala Dept of Mechanical Engineering
The Development of a Computer-Aided Conceptual Submarine Design Evaluation Tool
Final rept. 1 Sep 72-31 Aug 73
Arnold D. III Cotney, Glennon Maples, and David F. Dyer. Nov 73, 154
Contract N00014-73-A-0061-0001

Descriptors: *Submarines, Computerized simulation, Experimental design, Mission profiles, Submarine hulls, Underwater propulsion, Morphology, Mathematical models, Computer programs.
Identifiers: *Computer aided design, N.

The requirements for evaluating alternative conceptual submarine designs are presented. The morphology of a conceptual design evaluation tool is established and its basic components developed. Digital computer programs are used to facilitate analysis of design parameters. Representative parameters required by the design tool are determined for an existing submarine. A review of current research in the major areas of submarine design is presented. The effects of several of these technological advances are predicted for the example vessel through use of the design tool. (Author)

AD-772 385/1CP PC **A08**/MF **A01**
Bell Aerospace New Orleans La
Water-Augmented Vehicle (WAVE) Study - Phase I. Appendix I: Model I Computer Program and Computer Output
Final rept. 5 Jun-31 Dec 72
Charles D. Hope-Gill, George Rudinger, Stephen W. Zelazny, and John H. Morgenthaler. 1 Mar 73, 173p
Contract N00014-72-C-0306
See also report dated 1 Mar 73, AD-765 332.

Descriptors: *Surface effect ships, *Performance(Engineering), Thrust augmentation, Ducts, Two phase flow, Particle trajectories, Flow, Transverse.
Identifiers: WAVE(Water Augmented Vehicles), Water augmented vehicles, Computer aided analysis, N.

The report deals with the analytical investigation of the thrust augmentation, lift forces and mixing properties of a two-phase flow propulsion/lift system which has application to Air Cushion Vehicles (ACV) and Surface Effect Ships (SES). The results of Water-Augmented Vehicle (WAVE) computer program investigations show that significant thrust augmentation can be obtained by the injection of spray inherently produced through the interaction of ACV's and SES's with water surfaces. In addition, propulsive efficiencies of 60% can be obtained with relatively quiet operation. (Modified author abstract)

AD-772 847/0CP PC **E09**/MF **A01**
Naval Postgraduate School Monterey Calif
XR-3 Surface Effects Ship Test Craft: A Mathematical Model and Simulation Program with Verification
Master's thesis
Don G. Leo, and Richard Boncal. Dec 73, 243p

Descriptors: *Surface effect ships, Mathematical models, Equations of motion, Degrees of freedom, Pitch(Motion), Roll, Digital simulation, Theses, Computer programs, FORTRAN.
Identifiers: R-3 vessel, XR-3 vessel, Captured air bubbles, Six degrees of freedom, N.

The digital computer simulation of the six degrees of freedom equations of motion for the XR-3 captive air bubble testcraft is presented. The origin of this computer program is the SES Loads and Motion Program developed by Oceanics Inc. for the Bell 100 ton (100B) surface effect ship. Modifications and procedures used in the revision of the subroutines to convert the L and M Program from the 100B model to the XR-3 model is documented. Measurement data from XR-3 test runs are used to verify the model for steady-state operating conditions in calm water. Computer output for turn maneuvers in calm waters and for regular sea conditions are included. (Author)

AD-772 876/9CP PC **E05**/MF **A01**
Naval Postgraduate School Monterey Calif
Simulation of Hydrofoil Performance in Calm Water
Master's thesis
Gary Dee Hickox. Dec 73, 92p

Descriptors: *Hydrofoil craft, Computer programs, Automatic, Control systems, Hydrodynamics, Hydrofoils, Feedback, Simulation languages, Digital simulation, Theses.
Identifiers: N.

A digital computer simulation program using Digital Simulation Language is produced to study the performance of a hydrofoil in calm water. Various automatic control systems are studied with the model constrained to the pitch-heave-surge mode of operation. (Author)

AD-773 586/3CP PC **A04**/MF **A01**
Transportation Systems Center Cambridge Mass
Vessel Safety Model. Volume II. Users' Manual
Final rept. Jul 71-Jun 72
D. Kahn, T. Talbot, and J. Woodard. Jan 74, 74p
TSC-USCG-72-5-2, USCG-D-41-74
See also report dated Jan 74, AD-773 587.

Descriptors: *Ship motion, *Computerized simulation, *Harbors, *Collisions, Computer programming, Probability, Rivers, Routing, Safety, Instruction manuals, Mathematical models.
Identifiers: *Ship groundings, CG.

Volume 2 presents a User's Manual, which is based on the analytic development in Volume 1 for the mathematical simulation of ship movement in defined waterways. This manual provides an overall description of the model, and includes the five-command structure and the predefined track input, which form the basis for all possible ship movement in the model. The overall description of ship movement in the model, together with sections on program definitions of harbors, ships, contour data, time measurements, and probabilities of collision or grounding provide the user with an adequate understanding of the mathematical model and its operation.

AD-773 587/1CP PC **A07**/MF **A01**
Transportation Systems Center Cambridge Mass
Vessel Safety Model. Volume III. Programmers' Manual
Final rept. Jul 71-Jun 72
D. Kahn, T. Talbot, and J. Woodard. Jan 74,
148p TSC-USCG-72-5-3, USCG-D-42-74
See also report dated Jan 74, AD-773 586.

Descriptors: *Ship motion, *Computerized simulation, *Harbors, *Collisions, *Computer programs, Probability, Rivers, Routing, Safety, Instruction manuals, Mathematical models.
Identifiers: *Ship groundings, CG.

The volume presents and explains the individual programs in the mathematical model. Familiarization with the details of these programs will provide the programmer with the necessary information to effect program modifications where needed.

AD-775 223/1CP PC **E04**/MF **A01**
Arizona State Univ Tempe Dept of Mechanical Engineering
Noise Reduction in Hydraulic Systems
Final rept.
Earl Logan, Jr. Sep 72, 87p
Contract N00014-72-A-0070-0001

Descriptors: *Deep submergence vehicles, *Hydraulic equipment, *Noise reduction, Hydraulic pressure pumps, Piping systems, Hydraulic valves, Sound pressure, Mathematical analysis, Computer programs.
Identifiers: N.

A preliminary investigation of noise in hydraulic systems was undertaken in order to determine causes and methods for reduction of noise. A method for predicting the sound pressure level associated with fluid pumping was achieved. Predictions made by this method agreed with experimental measurements made on a representative hydraulic system developed for this research. It is recommended that the calculation method be extended to include all types of pumps and piping arrangements found in hydraulic systems and that the experimental apparatus be modified to further test predicted results. (Author)

AD-776 263/6CP PC **A09**/MF **A01**
Arizona Univ Tucson Engineering Experiment Station
Interactive Graphics Software for Use in Finite Element Analysis
Annual rept. 1 Jan-31 Dec 73
H. A. Kamel, and Michael W. McCabe. 28 Feb 74, 176p
Contract N00014-67-A-0209-0016

Descriptors: *Interactive graphics, *Computer programming, *Ship structural components, *Marine engineering, Time sharing, Structural properties, Numerical analysis, Computations, Minicomputers, Instruction manuals.
Identifiers: *Finite element analysis, Design, GIFTS computer program, N.

The report describes a graphics oriented general purpose analysis package aimed particularly at ship structure design using the finite element method on a time-sharing system. (Author)

AD-779 844/0CP PC **A05**/MF **A01**
Naval Ship Research and Development Center Bethesda Md
Divergence Analysis of Swept Hydrofoils-Computer Program (SWDIVRG)
Final rept.
John R. Caspar. Apr 74, 79p Rept no. NSRDC-4245

Descriptors: *Hydrofoil craft, *Hydrofoils, FORTRAN, Bending moments, Torsion, Lifting surfaces, Hydrodynamics, Mathematical models, Computer programs.
Identifiers: FORTRAN 4 programming language, SWDIVRG computer program.

A systematic approach is described by which divergence characteristics of swept or unswept hydrofoils may be calculated. The computer program, called SWDIVRG, developed to do the calculations makes use of a lumped-parameter approach, resulting in a matrix solution of the system. The bending and torsional displacements any of N stations along the hydrofoil span can be calculated at speeds less than divergence. Bending and torsional moments can be calculated for the condition of cantilever-beam constraints. The divergence speed is principally computed by an eigenvector iteration scheme. A convenient formulation and a plot are provided for estimating the hydrodynamic loading parameters for finite-span, surface-piercing hydrofoils. Also, a useful closed-form divergence formulation, which considers submergence level, has been derived for the special case of a uniform cantilever strut or foil. Test calculations of airfoil models and one hydrofoil model, using both SWDIVRG and the closed-form solution, show good agreement with experimental model-divergence speeds. (Author)

AD-781 861/0CP PC **E06**/MF **A01**
Naval Postgraduate School Monterey Calif
Multivariable Systems Design: A Two Ships Controller for Replenishment at Sea
Master's thesis
Celso Graca Lima. Jun 74, 129p

Descriptors: *Cargo ships, *Replenishment, *Seakeeping, Logistics, Steering, Control theory, Multivariate analysis, Computer programs, Theses.
Identifiers: *Replenishment at sea, *Supply afloat, Three degrees of freedom.

An investigation of the maneuvering control of two ships in the replenishment at sea operation, seen as a multivariable system, is carried out. The mathematical model of the ships motion in three degrees of freedom is established and implemented for the formation of digital computer programs and approximated for the study of steady state decoupling. Using parameter optimization techniques, the necessary control loops are designed with the aid of a digital computer. The station keeping problem of underway operation is simulated and the results compared and analyzed. (Author)

AD-783 034/2CP PC **E04**/MF **A01**
Naval Ship Research and Development Center Annapolis Md
Simulation of Maneuvering Characteristics of a Destroyer Study Ship Using a Modified Nonlinear Model
Research and development rept. Jul-Nov 73
Samuel H. Brown, and Reidar Alvestad. Aug 74, 70p Rept no. NSRDC-27-745

Descriptors: *Destroyers, *Surface navigation, Marine surface propulsion, Gas turbines, Analog simulation, Nonlinear algebraic equations, Steering, Computer programs.
Identifiers: *Ship maneuvering, LM-2500 gas turbines.

This report describes an analog computer maneuvering simulation of a destroyer study ship. The mathematical model which is used includes the ship propulsion machinery dynamics and the ship equations of motion. The model couples the ship propulsion dynamics equations with nonlinear maneuvering equations. The power plant representation consists of a simplified mathematical model of a General Electric LM2500 gas turbine engine and is primarily an engine mapping of engine torque versus engine speed using fuel flow rate as a parameter. The simulation is used to accurately predict slow transients in ship speed during maneuvers resulting from slow increases in the fuel flow rate to the gas turbine. (Modified author abstract)

AD-785 188/4CP PC **A09**/MF **A01**
Naval Academy Annapolis Md
Naval Shipyard Performance Evaluation
Research rept.
Mark D. Frost. 21 May 74, 180p Rept no. USNA-TSPR-55
Report on A Trident Scholar Project.

Descriptors: *Naval shore facilities, *Shipyards, Maintenance, Management planning and control, Economics, Statistical analysis, Regression analysis, Computer programs.
Identifiers: Trident scholar project.

The study attempts to provide a quick and realistic picture of overall shipyard performance. The powerful statistical tools of regression and correlation were applied to financial and operating data representative of the past five fiscal years - to determine functional relationships existing within the structure of shipyard operations. - The application of sten scores to ratio analysis provided the means to focus managerial attention on the relevant factors of shipyard performance. -A simple format was designed to provide a quick and comprehensive picture of overall shipyard performance to assist management in the decision-making process. Through the application of these statistical methods and analytical concepts, the efficiency and effectiveness of naval shipyard operations may be improved to provide lower costs to the customer activities of the U.S. Fleet. (Author)

AD-785 228/8CP PC **A05**/MF **A01**
Naval Ship Research and Development Center Bethesda Md
Comprehensive Evaluation of Six Thin-Wing Lifting-Surface Computer Programs
Henry T. Wang. Jun 74, 100p Rept no. NSRDC-4333

Descriptors: *Lifting surfaces, *Thin wings, *Hydrofoils, Hydrodynamic control surfaces, Planform, Aspect ratio, Subsonic flow, Vortices, Drag, Computer applications.
Identifiers: Computer aided design.

A comprehensive evaluation is made of six computer programs that analyze thin wing lifting surfaces in steady subsonic flow. The programs are compared with one another and with available experimental data for a total of 62 planform cases, 18 camber cases, and two flap cases. For the planform cases, four of the programs were generally in good agreement with each other and with experimental results, one program showed moderate differences, and the remaining program showed large differences. The agreement predicted and experimental results was erratic for the camber cases and poor for the flap cases. (Author)

AD-785 247/8CP PC **E04**/MF **A01**
Massachusetts Inst of Tech Cambridge Dept of Ocean Engineering
A Lifting-Surface Program for Trapezoidal Control Surfaces with Flaps
Final rept.
Justin E. Kerwin, and Bohdan W. Oppenheim.
Aug 74, 67p Rept no. 74-15
Contract N00014-67-A-0204-0067

Descriptors: *Marine rudders, *Hydrodynamic control surfaces, Lifting surfaces, Planform, Lift to drag ratio, Vortices, Computer programs.
Identifiers: Computer aided design.

A numerical lifting surface procedure is developed specifically for flapped control surfaces with trapezoidal planforms. The procedure uses a discrete vortex approximation with spanwise vortex lines located at constant percentages of the chord. Use of the procedure in obtaining an optimum flapped rudder design is demonstrated. A listing and user's description of the computer program is included. (Author)

AD-786 184/2CP PC **A04**/MF **A01**
Texas A and M Univ College Station Coastal and Ocean Engineering Div
Mechanics of Cable Mooring Systems. Volume IV. A Computer Program for Analyzing the Steady State Response of Bi and Quad Cable Arrays
Final rept. Nov 71-Feb 73
Richard F. Dominguez, and Nancy M. Muska.
Dec 72, 52p Rept no. COE-160
Contract N62477-72-C-0055
See also Volume 5, AD-786 185.

Descriptors: *Mooring, *Deep water, *Mechanical cables, *Parametric analysis, Hydrodynamics, Buoyancy, Dynamic loads, Dynamic response, Elastic properties, Hydrodynamic codes, FORTRAN, Computer programs.
Identifiers: *Mooring cables, *Cable arrays, Finite element analysis, Hydrodynamic loading, FORTRAN 4 programming language.

Described are two computer programs, BIMORC and QUADMORC, which were developed to evaluate the spatial configuration of a Bi-moored and Quad-moored cable array, respectively, containing a cylindrical member. Analysis is based on a finite element representation of the cables, using a lumped parameter treatment of all external forces acting on the system. The loadings which are assumed, are that of the dead weight of the structure and the hydrodynamic forces on the cables and moored member produced by directional currents. Listing of the computer programs is given along with an example of the usage of each. Both programs are written in FORTRAN 4. (Author)

AD-786 186/7CP PC **A04**/MF **A01**
Texas A and M Univ College Station Coastal and Ocean Engineering Div
Mechanics of Cable Mooring Systems. Volume VI. A Computer Program for Analyzing The Steady State Configuration of a Tri-Moored Array with Included Rigid and Deformable Members
Final rept. Nov 71-Feb 73
Richard F. Dominguez, Geral G. Greer, and Ann C. Liau. Jan 73, 51p Rept no. COE-162
Contract N62477-72-C-0055
See also Volume 7, AD-786 187.

Descriptors: *Mooring, *Deep water, *Mechanical cables, *Parametric analysis, Hydrodynamics, Buoyancy, Dynamic loads, Dynamic response, Elasticity, Hydrodynamic codes, FORTRAN, Computer programs.
Identifiers: *Mooring cables, *Cable arrays, Finite element analysis, Hydrodynamic loading, FORTRAN 4 programming language, TRIDEF computer program.

A computer program, TRIDEF, is described which was developed to evaluate the spacial configuration of a tri-moored cable array containing a cylindrical member. The member may be considered to be rigid or elastically deformable. Analysis is based on a finite element representation of a cable, using a lumped parameter treatment of all external forces acting on the system. The loadings which are assumed, are that of the dead weight of the structure and the hydrodynamic forces on the cables and moored member produced by directional currents. Listings of the computer program along with an example of its usage is given. The program is written in FORTRAN 4. (Author)

AD-786 187/5CP PC **A04**/MF **A01**
Texas A and M Univ College Station Coastal and Ocean Engineering Div
Mechanics of Cable Mooring Systems. Volume VII. The Steady-State Behavior of a Pyramid Array System
Final rept. Nov 71-Feb 73
Richard F. Dominguez, Geral G. Greer, and Ann C. Liau. Feb 73, 60p Rept no. COE-163
Contract N62477-72-C-0055
See also Volume 8, AD-786 188.

Descriptors: *Mooring, *Deep water, *Mechanical cables, *Parametric analysis, Hydrodynamics, Buoyancy, Dynamic loads, Dynamic response, Elasticity, Hydrodynamic codes, FORTRAN, Computer programs.
Identifiers: *Mooring cables, *Cable arrays, Finite element analysis, Hydrodynamic loading, FORTRAN 4 programming language, PYRAMID computer program.

The methodology developed to statically analyze a non-concurrent cable array composed of 6 cables within which is moored a large, rigid, delta element is presented. Analysis is based on a finite element representation of the cable, using a lumped parameter treatment of all external forces acting on the system. The loadings which are assumed consist of the dead weight of the structure and hydrodynamic forces produced by directional currents on the cables and moored member. A computer program, PYRAMID, is described and documented in the report along with an application example to a 7,000 ft. high cable array. (Author)

AD-786 188/3CP PC **A05**/MF **A01**
Texas A and M Univ College Station Coastal and Ocean Engineering Div
Mechanics of Cable Mooring Systems. Volume VIII. The Dynamic Response of Cable Arrays Subject to Large Current Induced Displacements
Final rept. Nov 71-Feb 73
Charles E. Nuckolls, and Richard F. Dominguez. Feb 73, 77p Rept no. COE-164
Contract N62477-72-C-0055
See also Volume 7, AD-786 187.

Descriptors: *Mooring, *Deep water, *Mechanical cables, *Parametric analysis, Hydrodynamics, Buoyancy, Dynamic loads, Dynamic response, Elastic properties, Hydrodynamic codes, FORTRAN, Computer programs.
Identifiers: *Mooring cables, *Cable arrays, Finite element analysis, Hydrodynamic loading, FORTRAN 4 programming language.

A technique has been developed by means of which the rigid-body response of a bi-moored cable system to various dynamic excitations encountered during deployment and operation can be predicted. The solution technique couples the method of imaginary reactions for solving the basic cable problem with the use of the phase-plane gamma method for solving the rigid-body equations of motion. The procedure which has been developed here was first applied to a simple model which was given initial conditions but no excitation. Its response compared favorably with an experimental observation, although showing an apparent discrepancy in the modeling of the drag forces. A typical prototype system was also analyzed. Its response to both in-plane and out-of-plane current profiles are presented. (Author)

AD-787 370/6CP PC **A05**/MF **A01**
Naval Postgraduate School Monterey Calif
An Aid for the Allocation of Resources in Ship Repairs at Naval Shipyards
Master's thesis
Enrique Medina Aedo. Sep 74, 96p

Descriptors: *Shipyards, *Scheduling, Management planning and control, Resources, Crews, Maintenance personnel, Allocations, Mathematical models, Computer programs, Theses.

The thesis provides shipyard planners with an aid to help them make their daily decisions about scheduling jobs and allocating manpower resources while trying to accomplish each project without delay beyond its scheduled completion date. A heuristic algorithm which focuses on the specific problems of the shipyard planners is developed and a computer program is included which performs all the necessary calculations and gives the planners a daily assignment of resources. Four other allocation procedures are surveyed. Two of these give solutions to the single project, multiresource problem; one procedure is an analytical model, the other is an empirical method; a third procedure is a heuristic approach to a multiproject, multiresource problem; and the last procedure is an analytical model which applies to the single project, single resource problem. (Author)

AD-811 927/CP PC **A05** MF **A01**
Oceanics, Inc., Plainview, N.Y.
A Study of Berthing Arrangements for Nuclear Submarines at the New London Submarine Base
Final rept. 17 Jun 66-18 Jan 67
Wilbur Marks, and Paul Kaplan. Mar 67, 88p
Rept no. TR-67-32
Contract NBy-70553
Distribution Limitation now Removed.

Descriptors: *Submarines, *Nuclear powered vessels, *Piers, Submarines, Design, Connecticut, Tides, Simulation, Computer programs, Configuration, Feasibility studies, Naval operations, Naval shore establishments, Optimization.

The problem of developing an optimum waterfront design for berthing nuclear submarines at the New London Submarine Base is treated primarily as an operational problem involving the interaction of the submarine with the physical environment of the channel. Preliminary investigation revealed that, of all the contributing elements, the pressence of tidal currents is the single greatest deterrent to achievement of a successful landing. With due consideration of physical environment, servicing and operational logistics, and practicality of implementation, it is deemed feasible to develop a berthing of arrangement that will satisfy all of these constraints. To evaluate the effectiveness of the proposed solution, a computer simulation experiment, of submarine landing, is developed and a parametric study is undertaken. Results show the optimum pier orientation and slip width appropriate to the present waterfront design. Additional experiments show that, for nuclear submarines, a sawtooth berthing arrangement is superior to the optimum conventional layout.

COM-71-00590/CP PC **A13** MF **A01**
Massachusetts Inst. of Tech., Cambridge. Dept. of Naval Architecture and Marine Engineering.
Computer Aided Prediction of Seakeeping Performance in Ship Design
Theodore A. Loukakis. Aug 70, 283p* 70-3, MA-RD-900-71-8
Contract MA-2710

Descriptors: *Ships, Design, *Hydrodynamics, Computerized simulation, Ship hulls, Performance, Forecasting, Computer programs, Motion, Mathematical models.
Identifiers: Computer aided design, *Seakeeping.

A computerized procedure is presented for the prediction of seakeeping performance in regular waves and in a seaway. Predictions are made for a given hull form or a Series 60 hull generated by the procedure. The results include: Absolute and relative motions, velocities and accelerations along the hull. Longitudinal shearing forces and bending moments along the hull. Mean added resistance. Seakeeping events, e.g. deck wetness, slamming, etc. Calm water powering. Calm water shearing forces and bending moments. The procedure is documented with all the necessary theoretical information, examples, descriptions of the input data and computer program listings. The program is written in FORTRAN IV computer language for an IBM/360-65 computer. (Author)

COM-71-00788/CP PC **A03** MF **A01**
Stevens Inst. of Tech., Hoboken, N. J. Davidson Lab.
Barge Trains in a Coastal Seaway. Part II. Predictions of Lateral Motions and Bending Moments
H. Eda. Jun 70, 44p SIT-DL-70-1523, MA-RD-901-71-16
Contract MA-2701
See also Part 1, COM-71-00471.

Descriptors: *Barges, *Hydrodynamics, Ship models, Surface waves, Pitching, Yaw, Model basins, Tugboats, Computer programs, Oscillations, Bending moments, Correlations, Model tests.
Identifiers: *Seakeeping, *Barge trains, Ship motions, Feeder services.

An analytical computer program was developed to predict oscillatory sway and yaw motions and lateral bending moments of push barge tows in a seaway. Predictions, from the computer program, for sway, yaw and lateral bending moment are given for two and three barge line ahead push tows. The lateral bending moment predictions are compared with model experiment results. (MA abstract)

COM-72-10866/CP PC **A07**/MF **A01**
Oceanics, Inc., Plainview, N.Y.
Buoy-Cable Dynamics Program. Computer Program Documentation Report
Final rept.
Theodore P. Sargent, Alfred I. Raff, and James Bentson. Apr 72, 148p NDBCM-6113.2
Contract NAS8-26879
Prepared in cooperation with Sperry Rand Corp., Great Neck, N. Y. Sperry Systems Management Div. See also COM-72-10865.

Descriptors: *Buoys, Hydrodynamics, *Computer programs, Programming manuals, Equations of motion, Wind(Meteorology), Ocean currents,

Ocean waves, Spectral analysis, Mooring, Computerized simulation, FORTRAN.
Identifiers: FORTRAN 4 programming language.

The user manual describes the Buoy-Cable Dynamics Program and its uses to determine the position and motions of a buoy-cable system under the affects of surface waves, current, and wind, which are all considered coplaner. This program has been developed for fast parametric studies. The wave input may either be specified as a table of wave frequencies or wavelengths with the wave amplitude of one foot or may be specified as one of three selectable sea spectra (Neumann, Pierson-Moskowitz or Two Parameter spectrum). This work discusses the capabilities of the program, options of input data deck, sub-routines, list of variables, error messages, a sample run, and program listings, with the intent of providing information necessary for quick and easy understanding of the program, promoting easy implementation and operation. (Author)

COM-73-11532/1CP PC **A08**/MF **A01**
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
The Nonlinear Dynamics of Cable Systems
Roderick Alfred Barr. Aug 73, 161p UC-IMR-74-1, Sea Grant Pub-4, NOAA-73090505
Contract NOAA-2-35208
Also pub. as California Univ., Berkeley. Coll. of Engineering, Rept. no. NA-73-3.

Descriptors: *Towing cables, Dynamic properties, *Ships, Towed bodies, Equations of motion, Boundary value problems, Ocean environments, Oceanography, Computer programs, Computerized simulation, Nonlinear differential equations, Finite difference theory, Numerical integration, Theses.
Identifiers: Method of characteristics, Underwater cable dynamics, Sea Grant program, NOAA.

A method is developed for calculating the dynamic response of towed-cable systems. This method, which is designed to provide realistic computational times, retains important nonlinearities but uses simplified equations of longitudinal motion. General equations of motion including terms due to elasticity, bending and internal damping are derived. The method of characteristics, which is an especially attractive method for solving these equations, can be used only if the equations are hyperbolic. It is shown that the equations are hyperbolic only if elasticity is included and bending and internal damping are neglected, and further, that bending and internal damping can be safely neglected for most cases. The excessive computational times required by the large longitudinal characteristic velocity (cable material sonic velocity) can be avoided if only the transverse equations of motion are solved by the method of characteristics. The equations of motion are simplified by a procedure similar to that used in deriving the boundary layer equations. A number of computed examples are presented.

COM-75-10345/7CP PC **A08**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Sea Grant Project Office.
Port Design and Analysis Methodology. Appendix
E. Frankel, B. Golden, P. Wilmes, R. Orner, and K. Chelst. 1 Dec 74, 155p* MITSG-74-31-App, NOAA-75011403-App
Grant NOAA-NG-43-72
Index No. 74-331-Nto. See also COM-75-10264.

Descriptors: *Seaports, *Design criteria, Harbors, Marine terminals, Harbor facilities, Facilities management, Cost analysis, Computerized simulation, Computer programs, User needs.
Identifiers: *Multiple purpose ports, *Multiports.

Contents: User's manual for linear approximation algorithm; The Ford-Bellman-Moor shortest path algorithm; Method of golden search; Program listings; Seaport simulation (Tanker terminal); Sample run of seaport simulation; Port simulation program details; Approximate fixed charge transportation algorithm.

COM-75-10929/8CP PC **A04**/MF **A01**
Avondale Shipyards, Inc., New Orleans, La.
Research on Computer Applications to Shipbuilding. Volume I. Final Report
E. Franzetti. May 75, 65p* MA-RD-930-75069-Vol-1
Contract MA-3-36228
Report on the National Shipbuilding Research Program. See also Volume 2, COM-75-10930.
Paper copy also available in set of 2 reports as COM-75-10928-SET, PC E99.

Descriptors: *Shipbuilding, *Computer aided design, Naval architecture, Marine engineering, Management planning, Shipyards, Ship structural components, Design standards, Information systems, Computer programs, Abstracts.
Identifiers: *Computer applications, *Data bases.

This report contains the results of a survey of the computer capabilities of the U.S. Shipbuilding Industry. It also contains an index or catalog of existing computer programs which are presently being used by the industry. The report identifies areas that are lacking in computer programming and makes recommendations as to what course of action should be taken in these areas.

COM-75-10930/6CP PC **A12**/MF **A01**
Avondale Shipyards, Inc., New Orleans, La.
Research on Computer Applications to Shipbuilding. Volume II. Catalog of Program Abstracts
E. Franzetti. May 75, 270p* MA-RD-930-75069-Vol-2
Contract MA-3-36228
Report on The National Shipbuilding Research Program. See also Volume 1, COM-75-10929.
Paper copy also available in set of 2 reports as COM-75-10928-SET, PC E99.

Descriptors: *Shipbuilding, *Computer aided design, Naval architecture, Marine engineering, Management planning, Shipyards, Ship structural components, Design standards, Information systems, Computer programs, Abstracts.
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This report contains the results of a survey of the computer capabilities of the U.S. Shipbuilding Industry. It also contains an index or catalog of existing computer programs which are presently being used by the industry. The report identifies areas that are lacking in computer programming and makes recommendations as to what course of action should be taken in these areas.

LA-UR-77-437 PC **A02**/MF **A01**
Los Alamos Scientific Lab., N.Mex.
Nonlinear Hydrodynamic Forces on Floating Bodies
B. D. Nichols, and C. W. Hirt. 1977, 4p Rept no. CONF-770910-1
Contract W-7405-ENG-36
International conference on numerical ship hydrodynamics, Berkeley, CA, USA, 19 Sep 1977.

Descriptors: *Cylinders, Dynamic loads, Hydrodynamics, Nonlinear problems, Ships, Stress analysis, Three-dimensional calculations, Two-dimensional calculations.
Identifiers: ERDA/420200, SOLA computer programs.

Two- and three-dimensional SOLA codes were used to investigate nonlinear and three-dimensional effects influencing the hydrodynamic forces on floating cylinders. In particular, nonlinear effects arising during large amplitude swaying motions of a two-dimensional 60 exp 0 triangular cylinder are presented. The results of the numerical studies are compared with data and an interpretation of the observed nonlinear effects is discussed. A second study is presented that compares two- and three-dimensional calculations of the triangular cylinder in sway. Here the end effects associated with finite length cylinders are noted. Nonlinear finite amplitude effects for the three-dimensional triangular cylinder are also studied. Finally, some results are presented for other nonlinear forces experienced by cylinders in two- and three-dimensional situations. (ERA citation 03:015607)

N71-30339/CP PC **A04** MF **A01**
Aeronautical Research Labs., Melbourne (Australia). Dept. of Supply.
A Study of Hydraulic Jet Propulsion in a Destroyer
P. C. Manins. Jul 70, 57p Rept no. ARL-ME-316

Descriptors: *Computer programs, *Hydraulic equipment, *Hydraulic jets, *Marine propulsion, Cavitation flow, Computerized design, Efficiency, Impellers, Propulsion system configurations.

For abstract, see STAR 0917

PB-247 176/1CP PC **A04**/MF **A01**
Massachusetts Univ., Amherst. Energy Alternatives Program.
On the Minimization of the Ocean Thermal Differences Machine Vehicle Sea Motions
Bruce A. Johnson, and Clayton R. Adams. Aug 75, 69p NSF/RANN/SE/GI-34979/TR/75/11, NSF/RA/N-75/121
Grant NSF-GI-34979

Descriptors: *Solar sea power plants, Equations of motion, Heaving, Pitching, Underwater vehicles, Computer programs.
Identifiers: Ship motion.

This report presents the results of the first phase of study of sea motions of pitch and heave of the Ocean Thermal Differences Machine Vehicle in the surfaced condition. Preliminary theory indicates the excitations for these motions are functions of the vehicle cross section and the vehicle length. Several vehicle parameters are then varied and the resulting seaway motions are calculated in an effort to find the configuration that achieves the least motion. The total motion for all frequency components of a seaway spectrum is calculated, and a figure of merit developed for minimum motion.

PB-258 082/7CP PC **A11**/MF **A01**
National Oceanographic Data Center, Washington, D.C.
Computer Programs in Marine Science
Mary A. Firestone. Apr 76, 236p* NOAA-76062212
Key to Oceanographic Records Documentation No. 5. See also report dated 1964, AD-613 598.

Descriptors: *Oceanography, *Computer programming, *Marine engineering, Computation, Computer graphics, Data processing, Air water interactions, Underwater sound, Ray tracing, Applications of mathematics, Marine geology, Surface navigation, Statistical analysis.
Identifiers: *Computer program documentation.

Since the last edition of 'Computer Programs in Oceanography' (compiled by Cloyd Dinger) was published in 1970, the National Oceanographic Data Center (NODC) has received many requests from scientists throughout the international oceanographic community for updated information on available programs. The present edition is in answer to this demand. Abstracts of seven hundred programs have been supplied by nearly eighty institutions in ten countries.

PB-262 040/9CP PC **A10**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Sea Grant Project Office.
A Hybrid Element Method for Calculating Three-Dimensional Water Wave Scattering
Dick K. P. Yue, H. S. Chen, and Chiang C. Mei. 1 Sep 76, 225p MITSG-76-10, NOAA-76111006
Index no. 76-310-Cbs. Sponsored in part by National Oceanic and Atmospheric Administration, Rockville, Md. Office of Sea Grant.

Descriptors: *Offshore structures, *Ocean waves, Finite element analysis, Water waves, Wave dispersion, Boundary value problems, Computer programs, FORTRAN.
Identifiers: Sea Grant program, Optical theorem, Atlantic Generating Station project.

Under the assumption of a harmonic, small-amplitude incident wave, an effective hybrid finite element method for calculating wave scattering by and resulting forces on a general three-dimensional body is presented. The method is applied to four different geometries. Analytic or independently obtained solutions are available for two of the geometries and comparison indicates perfect agreement. No other solutions are known for the other two geometries. All numerical results are checked using Optical Theorem, and convergence tests are performed. A user's manual for the computer program as well as suggested extensions to the program are also included. The present work is motivated by such needs in an imaginative project of ocean engineering, i.e., the Atlantic Generating Station project. For the proper design of mooring systems, prediction of possible basin and platform oscillation, and the wave forces, due to incoming sea is needed. This work deals with a modern numerical method which is potentially useful for the Atlantic Generating station as well as for other large ocean structures.

PB-262 154/8CP PC **A11**/MF **A01**
San Diego State Coll., Calif. Dept. of Civil Engineering.
Discrete Element Analysis and Its Experimental Verification for Pile Foundations Supporting Offshore Structures Under Dynamic Lateral Loads
Final rept. Apr 70-Aug 71
Sohan L. Agarwal. Aug 71, 241p
Grant NSF-GK-5340
Pub. in International Conference on Soil Mechanics and Foundation Engineering (8th), Moscow 1973; World Conference on Earthquake Engineering (5th), Rome (Italy) 1973; Symposium on Behaviour of Earth and Earth-Structures Subjected to Earthquakes and Other Dynamic Loads, Roorkee (India) 1973.

Descriptors: *Offshore structures, *Pile foundations, Dynamic loads, Lateral pressure, Soil mechanics, Finite difference theory, FORTRAN, Computer programs, Nonlinear systems.
Identifiers: FORTRAN 4 programming language, Pile 10 computer program, IBM-360/40 computers, Discrete element analysis.

The problem of a laterally loaded pile under static loads has been studied extensively, but the work relative to piles subject to dynamic lateral loads is quite limited. The purpose of this study is to understand the soil-structure interaction behavior of a dynamically laterally loaded pile. The objective of the study is divided into two parts: a theoretical treatment of the behavior of a pile under static, steady state dynamic, and transient lateral loads; and the testing and analysis of small-dimension piles under a variety of loads, frequency, stiffness, and soil support conditions. For part (1), the pile was represented by a discrete-element model and the soil by mass, Winkler's spring, and dashpot damping. The analysis included the determination of the response of pile under harmonic lateral loads, the natural frequency of the soil-pile system, and the response of the pile under impulse lateral loads. After the formulation of the equations based on numerical methods, appropriate computer programs were developed for the IBM 360/40 computer. For part (2), a comparison was made of the solutions obtained using the discrete-element and the classic methods for a few example problems. But for complete checks, a small-dimension instrumented pile was tested under controlled loading conditions.

PB-265 805/2CP PC **A03**/MF **A01**
Case Western Reserve Univ., Cleveland, Ohio. School of Engineering.
An Automated Bending System for the Fabrication of Ship Frames via Self - Adaptive Computer Control
Semi-annual progress rept. 1 Mar-31 Aug 73
H. W. Mergler, and D. K. Wright, Jr. Aug 73, 91p NSF/RA/T-73/075
Grant NSF-GI-35994

Descriptors: *Shipbuilding, *Metal bending, *Automatic control equipment, Automation, Adaptive control, Bending moments, Loads(Forces), Beams(Supports), Computer programs, Fortran.
Identifiers: Computer applications, Fortran 4 programming language.

This report includes discussions of: (a) experiments on the bending of model sections; (b) design and construction of a through feed bending fixture; (c) progress to date on computer control; (d) a modified time schedule; (e) financial summary to date; and an appendix 'An analytical method for the development of load displacement curves for the bending of rectangular beams.' The work of the second six months of the program is summarized and the work planned for the completion of the program is outlined.

PB-278 911/3CP PC **A05**/MF **A01**
Atlantic Research Corp., Alexandria, Va. Combustion Technology Group.
Hydrogen Suppression Study and Testing of Halon 1301. Phase III
Final rept. Oct 76-Mar 78
Edward T. McHale. Mar 78, 98p ARC-47-5702, MA-RD-920-78033
Contract MA-T-38169

Descriptors: *Marine nuclear propulsion, *Nuclear reactor accidents, *Nuclear reactor containment, Nuclear reactor safety, Protection, Reactivity, Toxicity, Hydrogen, Oxygen, Nitrogen, Fortran, Computer programs.
Identifiers: *Methane/bromo-trifluoro, *Loss of coolant, Halon 1301, Fortran H programming language.

In the event of a loss-of-coolant-accident in the reactor to be used to power nuclear ships, it can be postulated that sufficiently high concentrations of H2 and O2 might develop that a resulting explosion would produce overpressures that exceed the containment design. If a LOCA occurred and the H2 concentration reached the explosive limit, an inerting gas could be discharged into the containment to suppress any possible explosion. This report describes several aspects of a study that was conducted to evaluate the feasibility of employing Halon 1301 in an explosion suppression system for a maritime nuclear reactor. The results of the study support the concept of using Halon 1301 for containment protection. The work presented represents an extension of an earlier program (NTIS order no. PB-262 180). Instrumentation to monitor the chemical composition of a containment vessel atmosphere was evaluated; a study of the radiolytic decomposition of Halon 1301 in water was performed, and a computer code to calculate the Halon requirement of a containment is presented.

PB-281 654/4CP PC **A12**/MF **A01**
C-E Marine Power Systems, Windsor, Conn.
Improved Marine Boiler Reliability. Phase II. Volume III. Superheater Air Flow Model Tests
Final rept. on Task 3.
Apr 78, 273p MA-RD-920-77018
Contract MA-6-38088

Descriptors: *Marine propulsion, *Boilers, *Superheaters, *Flow distribution, Heat transfer, One dimensional flow, Cold flow, Boiler tubes, Temperature, Computer programs.

This report presents the results of a three-dimensional cold flow model study of flow distribution in a marine superheater and the associated analytical work. Flow distribution in a marine superheater was determined as a function of physical characteristics and load conditions. An analytical flow distribution model was developed for simple one-dimensional flow. A heat transfer program was developed to determine tube metal temperatures using the model flow distribution results. This work can be used to predict tube metal temperatures in superheaters for design purposes. (Portions of this document are not fully legible)

PB-283 045/3CP PC **A05**/MF **A01**
Nuclear Regulatory Commission, Washington, DC. Div. of Site Safety and Environmental Analysis.
Calculation of Releases of Radioactive Materials in Gaseous Effluents from Nuclear-Powered Merchant Ships (NMS-GEFF Code)
F. P. Cardile, R. L. Bangart, and J. T. Collins. Jul 78, 93p Rept no. NUREG-0466

Descriptors: *Nuclear powered ships, *Merchant ships, *Radioactive contaminants, Radioactive wastes, Mathematical programming, Computer programs, FORTRAN, Pressurized water reactors.
Identifiers: *Radioactive effluents, Gaseous wastes, NMS-GEFF computer program, CDC FORTRAN programming language.

The Intergovernmental Maritime Consultative Organization (IMCO) is currently preparing guidelines concerning the safety of nuclear-powered merchant ships. An important aspect of these guidelines is the determination of the releases of radioactive material in effluents from these ships and the control exercised by the ships over these releases. To provide a method for the determination of these releases, the NRC staff has developed a computerized model, the NMS-GEFF Code, which is described in the following chapters. The NMS-GEFF Code calculates releases of radioactive material in gaseous effluents for nuclear-powered merchant ships using pressurized water reactors.

PB-283 211/1CP PC **A05**/MF **A01**
Sharp (George G.) Inc., New York.
Computer Solution of Accelerations Caused by Collision. Volume I. Report
Final rept. Jan-May 78
J. C. Gotimer. 21 Apr 78, 86p MA-RD-920-78049
Contract MA-7-38028

Descriptors: *Nuclear powered ships, *Tankers, *Collision research, Vibration, Acceleration, Bending moments, Transient response, Computer applications.
Identifiers: *Supertankers, GBRC computer program, *Impact acceleration.

Using methods of forced vibration analysis, calculations of impact accelerations were carried out in way of the reactor space of a 600,000 ton nuclear tanker when struck by another ship in the area of the collision barrier. The General Bending Response Program was used by representing the ship as an elastically coupled non-uniform beam-spring model subject to a Fourier series representation of the transient force of impact. Sectional properties were developed for the ship in both ballast and full load conditions in order to describe the model. Sensitivity calculations were made for variations in loading conditions, ship-hull damping, impact duration and impact magnitude for the lateral mode of vibration. An additional calculation was made for the combined torsional-horizontal bending mode of vibration.

PB-283 212/9CP PC **A06**/MF **A01**
Sharp (George G.), Inc., New York.
Sectional Property Tabulations for Computer Solution ofAccelerations Caused by Collision. Volume II
Final rept. Jan-May 78
C. C. Yang. 3 May 78, 119p MA-RD-920-78054
Contract MA-7-38028

Descriptors: *Nuclear powered ships, *Tankers, *Collision research, Vibration, Acceleration, Bending moments, Transient response, Computer applications.
Identifiers: *Supertankers, GBRC computer program, *Impact acceleration.

Using the main scantlings for a 600,000 ton nuclear tanker and curves of weight per foot including steel outfit machinery and deadweight items developed by Newport News Shipbuilding, the vessel was divided into 20 sections with half stations at the ends. Cross sectional area, mass, moment of inertia and virtual mass were calculated at each section. Additional properties required for the virtical, horizontal and combined torsional-horizontal bending modes of vibration were calculated. These properties were calculated for both the ballast and full load conditions, and are used as input data to the General Bending Response Program as described in Volume I.

PB-284 174/0CP PC **A07**/MF **A01**
Hydronautics, Inc., Laurel, Md.

The Development and Validation of a Mathematical Model for the Design of Protection Barriers for Nuclear Powered Ships
Rept. for 10 Jun 76-31 Mar 78
Pin Yu Chang. Mar 78, 130p MA-RD-920-78037
Contract MA-6-38081

Descriptors: *Nuclear powered ships, *Collisions, *Ship hulls, *Barriers, Loads(Forces), Impact strength, Shock resistance, Mathematical models, Computer applications, Finite element analysis.
Identifiers: ANSYS computer program, MARC computer program.

A mathematical model for the analysis and design of protection barrier structures is developed. The analysis procedure is based on the collapse theorems, i.e., the Upper Bound Theorem and the Lower Bound Theorem. The collision protection barrier is analyzed by a finite element program with capabilities of nonlinear and elastoplastic analysis. The results obtained from the mathematical model are compared with those obtained from the collision model tests.

PB-284 193/0CP PC **A04**/MF **A01**
Hydronautics, Inc., Laurel, Md.
Input Data Instructions - Simplified Documentation of the Computer Program ANSYS
Report for 10 Jun 76-31 Mar 78
P. Y. Chang. Feb 78, 73p MA-RD-920-78035A
Contract MA-6-38081

Descriptors: *Nuclear powered ships, *Collisions, *Ship hulls, *Barriers, Stress analysis, Finite element analysis, Mathematical models, Computer programming, Computer applications.
Identifiers: ANSYS computer program.

A simplified version of the input instructions for the computer program 'ANSYS' is presented for the non-linear elastoplastic analysis of a ship collision protection barrier structure. All essential information necessary for the grillage model are summarized while eliminating the instructions for other types of the problems. A benchmark example is given for checking the computer program.

PB-286 238/1CP PC **A03**/MF **A01**
Massachusetts Inst. of Tech., Cambridge. Marine Industry Advisory Services.
Computer-Aided Preliminary Design of Ships
Norman Doelling. 1 Jul 78, 26p MITSG-78/13, OPPORTUNITY BRIEF-13, NOAA-78082103
Index No. 78-713-Ztb. Report on MIT/Marine Industry Collegium Program.

Descriptors: *Shipbuilding, *Computer applications, Design, Computer programming, Data processing, Fortran.
Identifiers: *Computer aided design, DEX computer program.

A computer-based system specifically organized and implemented to aid in the preliminary design of ships and other complex naval systems is described. The system consists, in part, of a set of related computer programs (such as seakeeping programs, stability programs, calm water resistance programs, and many others), which have proven to be useful design tools. There are more than 15 distinct programs, and the number is growing. These programs are written in Fortran, and all are in the public domain. The only exception is the seakeeping program, which is available to U.S. companies only.

PB-286 655/6CP PC **A07**/MF **A01**
Farrell Lines, Inc., NY.
Long Range Fleet Planning Study Vessel Configuration System (Trade Route 27). Volume I: Report
Final rept. Oct 77-Sep 78
M. Malinofsky, and C. Johnson. Aug 78, 136p MA/RD-930-79007A
Contract MA-7-38080
Prepared in cooperation with Keplar Galen and Associates, Inc., Ridgewood, NJ.

Descriptors: *Cargo ships, *Financial management, Marine transportation, Design, Cargo transportation, Shipping containers, Logistics management, Management analysis, Linear programming, Commodity management, Cost analysis.
Identifiers: MPSX computer program, Containerships, LASH(Lighter Aboard Ships), Lighter aboard ships.

This report covers the development and application of an optimum vessel configuration model in the context of Farrell Lines Trade Route 27 services from the U.S. Pacific Coast to Australia and New Zealand. The solution methodology selected was a linear programming technique employing a matrix of variables and constraints of large size. Included were considerations of commodity type, cargo technology, and port pairings. The model's output was interpreted and results presented for management action.

PB-286 656/4CP PC **A10**/MF **A01**
Farrell Lines, Inc., NY.
Long Range Fleet Planning Study Vessel Configuration System (Trade Route 27) Volume II: Appendix
Final rept. Oct 77-Sep 78
M. Malinofsky, and C. Johnson. Aug 78, 202p MA/RD-930-79007B
Contract MA-7-38080
Prepared in cooperation with Keplar Galen and Associates, Inc., Ridgewood, NJ.

Descriptors: *Cargo ships, *Financial management, Marine transportation, Design, Cargo transportation, Shipping containers, Logistics management, Management analysis, Linear programming, Commodity management, Cost analysis.
Identifiers: MPSX computer program, Containerships, LASH(Lighter Aboard Ships), Lighter aboard ships.

This report covers the development and application of an optimum vessel configuration model in the context of Farrell Lines Trade Route 27 services from the U.S. Pacific Coast to Australia and New Zealand. The solution methodology selected was a linear programming technique employing a matrix of variables and constraints of large size. This appendix contains a listing of the results of the economic analysis. (Portions of this document are not fully legible)

PB-287 095/4CP PC **A07**/MF **A01**
Case Western Reserve Univ., Cleveland, OH. School of Engineering.
Stabilization of High Aspect Ratio Beams During Bending for Use as Ship Frames. Part III
H. W. Mergler, and D. K. Wright, Jr. Sep 76, 144p NSF/RA-761596
Grant NSF-GI-35994

Descriptors: *Shipbuilding, *Ship hulls, Bending, Aspect ratio, Steel structures, Metal bending, Cold working, Bending moments, Buckling, Computer programs.
Identifiers: CBEAM FR computer program, High aspect ratio, Computer aided manufacturing, Metal bending machines.

During the plastic bending of high aspect ratio beams, typically encountered in ship frames, the edge of the beam on the inside of the curvature is subjected to compressive stress above the yield point. If this is a free edge, as for angle or rectangular cross sections, the web is subjected to a potential buckling situation. Flanges are subject to similar instability. This report deals with potential solutions to these problems. Experimental work was carried out with small scale beams to determine characteristics of the buckling phenomenon in beam webs and the magnitude of force required to constrain beam webs to prevent buckling. A theoretical approach to plastic buckling is advanced and used to extrapolate the requirements for stabilizing full size ship frames. Two stabilization systems were designed, constructed, and tested in a model beam bender developed in earlier work. These are evaluated for potential use in a commercial bending machine.

SUBJECT INDEX

ACCIDENT INVESTIGATIONS

Capsizing/Swamping Accident Investigations for 1974 Season. Volume I. Research Report
AD-A015 142/3CP

Capsizing/Swamping Accident Investigations for 1974 Season. Volume II. Appendices B-U
AD-A018 568/6CP

ACCIDENTS

Capsizing/Swamping Accident Investigations for 1974 Season. Volume I. Research Report
AD-A015 142/3CP

Preliminary Analysis of Tanker Collisions and Groundings
AD-757 175/CP

ACOUSTIC EMISSIONS

Sound Radiation from an Orthotropic Plate Supported by a Double Set of Stiffeners
AD-A013 320/7CP

Vibratory Response and Acoustical Radiation of a Water-Loaded, Turbulence-Excited Plate-Cavity System--Option 6
AD-A020 437/0CP

ADAPTIVE CONTROL SYSTEMS

Automatic Control Systems for Longitudinal Motion of Semisubmerged Ships
AD-752 007/CP

ADAPTS (AIR DELIVERABLE ANTI POLLUTION TRANSFER SYSTEMS)

The Operational Capabilities of the Proposed Air Deliverable Anti-Pollution Transfer System (ADAPTS). Volume 2. Documentation of the Simulation Model, BAGSIM
AD-731 807/CP

ADVANCED BASES

The Motion of Floating Advanced Base Components in Shoal Water -- A Comparison between Theory and Field Test Data
AD-A007 489/8CP

AIR CUSHION VEHICLES

Refinements of the Seal Subroutines and Fan Air Flow Maps for the XR-3 Loads and Motion Program
AD-A004 616/9CP

AIRCRAFT

A Simulation of a Computer Graphics-Aided Aircraft Handling System
AD-A012 418/0CP

AIRCRAFT CARRIERS

A Simulation of a Computer Graphics-Aided Aircraft Handling System
AD-A012 418/0CP

A Feasibility Study of Heat Transfer Improvement in Marine Steam Condensers
AD-A048 783/5CP

Performance Analysis of a Turbo-Type Energy Absorber for an Aircraft Carrier Arresting Gear
AD-728 682/CP

Carrier Aircraft Operational Compatibility System (CAOCS - MOD 2) Computer Program
AD-732 755/CP

ALTERNATORS

A Synchronous Generator/Voltage Regulator Simulation for the Digital Computer
AD-A001 277/3CP

ALUMINUM

Development of Analytical and Empirical Systems for Parametric Studies of Design and Fabrication of Welded Structures
AD-A050 908/3CP

ALUMINUM ALLOYS

Considerations for the Structural Detailing of Aluminum Ships. Guidelines for the Conversion of CASDOS
AD-A001 377/1CP

Properties of Combined Aluminum Tee Extrusion and Plate
AD-A031 490/6CP

ALUMINUM SHIPS

Considerations for the Structural Detailing of Aluminum Ships. Guidelines for the Conversion of CASDOS
AD-A001 377/1CP

AOR 4 VESSEL

Control of Nuclear Propulsion Plant Power Transients
AD-A012 458/6CP

ARRESTING GEAR

Performance Analysis of a Turbo-Type Energy Absorber for an Aircraft Carrier Arresting Gear
AD-728 682/CP

AUTOMATIC CONTROL EQUIPMENT

An Automated Bending System for the Fabrication of Ship Frames via Self - Adaptive Computer Control
PB-265 805/2CP

BAGS (CONTAINERS)

The Operational Capabilities of the Proposed Air Deliverable Anti-Pollution Transfer System (ADAPTS). Volume 2. Documentation of the Simulation Model, BAGSIM
AD-731 807/CP

BARGE TRAINS

Barge Trains in a Coastal Seaway. Part II. Predictions of Lateral Motions and Bending Moments
COM-71-00788/CP

BARGES

Barge Trains in a Coastal Seaway. Part II. Predictions of Lateral Motions and Bending Moments
COM-71-00788/CP

BARRIERS

The Development and Validation of a Mathematical Model for the Design of Protection Barriers for Nuclear Powered Ships
PB-284 174/0CP

Input Data Instructions - Simplified Documentation of the Computer Program ANSYS
PB-284 193/0CP

BEAM WAVES

Computation of Loads Acting on the Cross-Structure and Struts of Twin Hull Ships in Beam Waves
AD-A027 862/2CP

BEAMS (STRUCTURAL)

Transient Response Calculation in the Frequency Domain with General Bending Response Program (GBRP)
AD-725 505/CP

BENDING

An Updated Guide to the Use of General Bending Response Program (GBRP)
AD-A015 948/3CP

BENDING MOMENTS

Computation of Loads Acting on the Cross-Structure and Struts of Twin Hull Ships in Beam Waves
AD-A027 862/2CP

BOATING ACCIDENTS

Capsizing/Swamping Accident Investigations for 1974 Season. Volume I. Research Report
AD-A015 142/3CP

Capsizing/Swamping Accident Investigations for 1974 Season. Volume II. Appendices B-U
AD-A018 568/6CP

BOATS

Capsizing/Swamping Accident Investigations for 1974 Season. Volume I. Research Report
AD-A015 142/3CP

Capsizing/Swamping Accident Investigations for 1974 Season. Volume II. Appendices B-U
AD-A018 568/6CP

Hydrostatics and Equilibrium Characteristics Computer Program for Recreational Boats
AD-A033 609/9CP

Experiments in Small Craft Leeway
AD-A055 321/4CP

LODCAP - Recreational Small Boat Live Load Capacity Computer Program
AD-747 790/CP

FLSTAB: Recreational Small Boat Flooded Stability Program
AD-767 428/6CP

Recreational Boat Developmental Test Program Developmental Testing. Volume II. Tests, Methods and Reports
AD-769 872/3CP

BOILERS

Multivariable Control of a Marine Boiler
AD-A061 282/0CP

Improved Marine Boiler Reliability. Phase II. Volume III. Superheater Air Flow Model Tests
PB-281 654/4CP

BOUNDARY LAYER

A Study of the Drag Characteristics and Polymer Diffusion in the Boundary Layer of an Axisymmetric Body
AD-A024 667/8CP

BOUNDARY LAYER FLOW

User's Manual for a FORTRAN IV Computer Program for Calculating Propeller/Stern Boundary-Layer Interaction on Axisymmetric Bodies
AD-A037 063/5CP

An Analytical Study of the Effect of Surface Roughness on Boundary-Layer Stability
AD-A048 465/9CP

BULKHEADS

Divider Design - An Extension of the Computer Graphics Arrangement Program (COGAP) User's/Systems Manual
AD-A030 569/8CP

BUOYANCY

Investigation of the Performance of Personal Flotation Devices
AD-A017 101/7CP

BUOYS

Preliminary Report on a Fortran IV Computer Program for the Two-Dimensional Dynamic Behavior of General Ocean Cable Systems
AD-A014 328/9CP

U. S. Coast Guard Moored Buoy Data Handling and Analysis
AD-A035 686/5CP

Mooring Mechanics. A Comprehensive Computer Study. Volume II. Three Dimensional Dynamic Analysis of Moored and Drifting Buoy Systems
AD-A038 248/1CP

Analysis of the Motion of a Tri-moored Buoy with Neutrally Buoyant Legs for Installation in the Deep Ocean Environment
AD-724 860/CP

Analysis of the Two-Dimensional Steady-State Behavior of Extensible Free-Floating Cable Systems
AD-738 000/CP

Buoy-Cable Dynamics Program. Computer Program Documentation Report
COM-72-10866/CP

CABLE ARRAYS

Mechanics of Cable Mooring Systems. Volume IV. A Computer Program for Analyzing the Steady State Response of Bi and Quad Cable Arrays
AD-786 184/2CP

Mechanics of Cable Mooring Systems. Volume VI. A Computer Program for Analyzing The Steady State Configuration of a Tri-Moored Array with Included Rigid and Deformable Members
AD-786 186/7CP

Mechanics of Cable Mooring Systems. Volume VII. The Steady-State Behavior of a Pyramid Array System
AD-786 187/5CP

Mechanics of Cable Mooring Systems. Volume VIII. The Dynamic Response of Cable Arrays Subject to Large Current Induced Displacements
AD-786 188/3CP

CABLE ASSEMBLIES

Analysis of the Two-Dimensional Steady-State Behavior of Extensible Free-Floating Cable Systems
AD-738 000/CP

CABLE FAIRINGS

The Configuration and Loading of a Torisonally Elastic Faired Cable
AD-768 319/6CP

CABLE STRUMMING

Harmonic Motion of Cylinders in Uniform Flow
AD-A012 412/3CP

CABLES

Preliminary Report on a Fortran IV Computer Program for the Two-Dimensional Dynamic Behavior of General Ocean Cable Systems
AD-A014 328/9CP

CABLES (MECHANICAL)

Analysis of the Motion of a Tri-moored Buoy with Neutrally Buoyant Legs for Installation in the Deep Ocean Environment
AD-724 860/CP

Effect of Nonplanar Current Profiles on the Configuration of Moored Cable Systems
AD-737 999/CP

Anchor Cable Dynamics
AD-747 085/CP

Computer Programs for the Static Analysis of Single Point Moored Surface and Subsurface Buoy Systems
AD-761 164/CP

A Fortran IV Program for Computing the Static Deflections of Structural Cable
AD-767 309/8CP

The Configuration and Loading of a Torisonally Elastic Faired Cable
AD-768 319/6CP

CANALS

Wave Resistance of Asymmetric Pressure Distributions Moving in a Canal
AD-A005 650/7CP

CAPSIZING

Development of a Time Domain Simulation for Ship Capsizing in following Waves
AD-770 330/9CP

CAPTIVE AIR BUBBLE VESSELS

Investigation of a Linear, Two-Degree-of-Freedom Simulation of the XR-3 Captured Air Bubble (CAB) Craft in the Frequency Domain
AD-A044 325/9CP

CAPTIVE AIRSPACE CRAFT

Investigation of a Linear, Two-Degree-of-Freedom Simulation of the XR-3 Captured Air Bubble (CAB) Craft in the Frequency Domain
AD-A044 325/9CP

SUBJECT INDEX

CAPTURED AIR BUBBLE SHIPS

A Study of Pressure-Volume Rates and Plenum Membrane Additions to the Captured Air Bubble Surface Effect Ship XR-3 Digital Computer Loads and Motion Program
AD-A026 397/0CP

Turning Characteristics of the Bell 100 Ton Surface Effect Ship
AD-767 680/2CP

CARGO SHIPS

Theoretical Estimates of Wave Loads on the SL-7 Container Ship in Regular and Irregular Seas
AD-A004 554/2CP

Microcomputer Application to Compute a Ship's Draft and Longitudinal Stress
AD-A038 810/8CP

Correlation of Model and Full-Scale Results in Predicting Wave Bending Moment Trends
AD-753 223/CP

Program 'TRANSHIP' - A Computer Program for the Design of the Midship Section of a Transversely-Framed Dry Cargo Ship. Part II
AD-753 531/CP

Computer Programs for the Digitizing and Using of Library Tapes of Ship Stress and Environment Data
AD-768 863/3CP

Multivariable Systems Design: A Two Ships Controller for Replenishment at Sea
AD-781 861/0CP

Long Range Fleet Planning Study Vessel Configuration System (Trade Route 27). Volume I: Report
PB-286 655/6CP

Long Range Fleet Planning Study Vessel Configuration System (Trade Route 27) Volume II: Appendix
PB-286 656/4CP

CATAMARANS

Computation of Loads Acting on the Cross-Structure and Struts of Twin Hull Ships in Beam Waves
AD-A027 862/2CP

Determination of Damping Coefficients of Swath Catamaran Using Thin Ship Theory
AD-A031 293/4CP

Simplified Theoretical Methods of Predicting the Motions of a Catamaran in Waves
AD-738 435/CP

CAVITATING FLOW

A Numerical Method for Two-Dimensional, Cavitating, Lifting Flows
AD-A016 953/2CP

CAVITATION

Comparison of Computer Predicted and Experimentally Determined Leading Edge Cavitation of a Foil with Flaps
AD-A015 874/1CP

A Numerical Method for Two-Dimensional, Cavitating, Lifting Flows
AD-A016 953/2CP

Computer Program Description for Supercavitating Hydrofoil Section Design According to Linearized Theory
AD-A018 241/0CP

Non Linear Calculation of Supercavitating Hydrofoils Near a Free Surface
AD-A032 789/0CP

CLAMPED PLATES

Vibratory Response and Acoustical Radiation of a Water-Loaded, Turbulence-Excited Plate-Cavity System--Option 6
AD-A020 437/0CP

CLOSED LOOP SYSTEMS

The Analysis of a Longitudinal Control System for Underwater Vehicles
AD-A021 838/8CP

COAST GUARD SHIPS

The Cutter Resource Effectiveness Evaluation (CREE) Program -- A Guide for Users and Analysts
AD-A053 644/1CP

Cost Effectiveness Study of Wastewater Management Systems for Selected U.S. Coast Guard Vessels. Volume II. Effectiveness Assessment of Candidate Systems
AD-A060 962/8CP

COGAP COMPUTER PROGRAM

Divider Design - An Extension of the Computer Graphics Arrangement Program (COGAP) User's/Systems Manual
AD-A030 569/8CP

COLLISION RESEARCH

Preliminary Analysis of Tanker Collisions and Groundings
AD-757 175/CP

Computer Solution of Accelerations Caused by Collision. Volume I. Report
PB-283 211/1CP

Sectional Property Tabulations for Computer Solution ofAccelerations Caused by Collision. Volume II
PB-283 212/9CP

COLLISIONS

Vessel Safety Model. Volume II. Users' Manual
AD-773 586/3CP

Vessel Safety Model. Volume III. Programmers' Manual
AD-773 587/1CP

The Development and Validation of a Mathematical Model for the Design of Protection Barriers for Nuclear Powered Ships
PB-284 174/0CP

Input Data Instructions - Simplified Documentation of the Computer Program ANSYS
PB-284 193/0CP

COMPARTMENTS

A Computer Program for Plotting the Cellular Structure of Ships
AD-A015 334/6CP

COMPUTER AIDED DESIGN

Hydrofoil Analysis and Design Program (HANDE)
AD-A005 487/4CP

Hydrofoil Analysis and Design Program (HANDE)
AD-A005 488/2CP

Computerization of the Mean Streamline Blade Design Method
AD-A011 089/0CP

A Computer Program for Plotting the Cellular Structure of Ships
AD-A015 334/6CP

Computational Methods in Ship Hydrodynamics
AD-A022 305/7CP

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 1
AD-A025 704/8CP

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 2
AD-A025 705/5CP

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 3
AD-A025 706/3CP

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 4
AD-A025 707/1CP

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 5
AD-A025 708/9CP

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 6
AD-A025 709/7CP

LX Synthesis Model Hullform Development - Normalized Bonjean Curves
AD-A029 795/2CP

Interactive Parameter Analysis Program (IPAP) - User's Manual
AD-A029 796/0CP

Powering Prediction for Various Hybrid Ship Concepts
AD-A030 530/0CP

Divider Design - An Extension of the Computer Graphics Arrangement Program (COGAP) User's/Systems Manual
AD-A030 569/8CP

A Computer Program for the Preliminary Design of Contrarotating Propellers
AD-A030 709/0CP

A Lifting Line Computer Program for Preliminary Design of Propellers
AD-A030 720/7CP

Assessment of Ship Dynamics Programs for Possible Integration into the Integrated Ship Design System
AD-A043 174/2CP

Structural Synthesis Design Program
AD-A048 162/2CP

Computer-Assisted Design of Pump Impellers
AD-A050 187/4CP

Interactive Parameter Analysis Program (IPAP) (User's Manual) (Revision)
AD-A052 151/8CP

Development and Application of a Multiloop, Laplace Domain Analysis Technique to Control System Design for Underwater Vehicles
AD-A057 190/1CP

An Analysis of the Benefits Obtained Using the NAVSHIPS Cabling/Wiring (WIRES) Computer Program for Ship Overhaul Projects
AD-725 146/CP

Program 'TRANSHIP' - A Computer Program for the Design of the Midship Section of a Transversely-Framed Dry Cargo Ship. Part II
AD-753 531/CP

The Development of a Computer-Aided Conceptual Submarine Design Evaluation Tool
AD-771 448/8CP

Research on Computer Applications to Shipbuilding. Volume I. Final Report
COM-75-10929/8CP

Research on Computer Applications to Shipbuilding. Volume II. Catalog of Program Abstracts
COM-75-10930/6CP

Computer-Aided Preliminary Design of Ships
PB-286 238/1CP

COMPUTER APPLICATIONS

Computer Program Description for Supercavitating Hydrofoil Section Design According to Linearized Theory
AD-A018 241/0CP

SOLVEDG, An Out-of-Core System Solver for Large Order Positive Definite Systems of Linear Equations
AD-770 618/7CP

Research on Computer Applications to Shipbuilding. Volume I. Final Report
COM-75-10929/8CP

Research on Computer Applications to Shipbuilding. Volume II. Catalog of Program Abstracts
COM-75-10930/6CP

Computer-Aided Preliminary Design of Ships
PB-286 238/1CP

COMPUTER GRAPHICS

Divider Design - An Extension of the Computer Graphics Arrangement Program (COGAP) User's/Systems Manual
AD-A030 569/8CP

COMPUTER PROGRAM DOCUMENTATION

Software Management for Shipboard Computer Systems
AD-A035 161/9CP

Computer Programs in Marine Science
PB-258 082/7CP

COMPUTER PROGRAMMING

Manual: NSRDC Ship-Motion and Sea-Load Computer Program
AD-A008 335/2CP

Depot Maintenance Planning and Programming System (DMPPS). Volume 3. Alterations Subsystem
AD-A056 798/2CP

Interactive Graphics Software for Use in Finite Element Analysis
AD-776 263/6CP

Computer Programs in Marine Science
PB-258 082/7CP

COMPUTER PROGRAMS

The Pien Wavemaking Resistance Computation Program. Part 2. Users Manual
AD-A013 218/3CP

Data Generation for Finite-Element Structural Analysis of Three-Dimensional Naval Ship Structures
AD-A014 125/9CP

An Updated Guide to the Use of General Bending Response Program (GBRP)
AD-A015 948/3CP

Results of Exercising a Synthesis Routine for Small Waterplane Area Twin Hull (SWATH) Ships and Comparison with Model Experiments
AD-A018 560/3CP

Submarine Effects Engineering Code. 4. Operating Instructions
AD-A018 789/8CP

Study of the Roll and Pitch Transients in Calm Water Using the Simulated Performance of the XR-3 Surface Effect Ship Loads and Motions Computer Program
AD-A021 832/1CP

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 5
AD-A025 708/9CP

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 6
AD-A025 709/7CP

SPAN: A Computer Program for Static and Dynamic Analysis of Stiffened Plates and Grillages
AD-A026 865/6CP

Computer Program for Estimation of Extreme Values Based on the Generalized Gamma Distribution
AD-A030 090/5CP

Powering Prediction for Various Hybrid Ship Concepts
AD-A030 530/0CP

Divider Design - An Extension of the Computer Graphics Arrangement Program (COGAP) User's/Systems Manual
AD-A030 569/8CP

A Computer Program for the Preliminary Design of Contrarotating Propellers
AD-A030 709/0CP

A Lifting Line Computer Program for Preliminary Design of Propellers
AD-A030 720/7CP

Hydrostatics and Equilibrium Characteristics Computer Program for Recreational Boats
AD-A033 609/9CP

A Computer Program for Calculation of the Residual Stress Distribution and the Effective Stress-Strain Curve of Cold-Formed Structural Members
AD-A034 996/9CP

Software Management for Shipboard Computer Systems
AD-A035 161/9CP

Manual for Mono-Hull or Twin-Hull Ship Motion Prediction Computer Program
AD-A038 061/8CP

Structural Seaworthiness Digital Computer Program ROSAS (A Conversion from Seaworthiness Analog Computer)
AD-A039 510/3CP

Ship Propulsion Shafting Bearing Reaction Programs MGE2 and MGE5 for IBM 7090 (with notes on Univac LARC)
AD-A041 797/2CP

Hullborne Hydrofoil Six-Degree of Freedom Motion Prediction Computer Program
AD-A044 220/2CP

A Methodology for Quantifying the Operational Effects of Ship Seakeeping Characteristics
AD-A045 443/9CP

A Computer Program for Structural Response to Ship Slamming (SLAM)
AD-A046 266/3CP

SPAN: User's Summary. Addendum
AD-A047 021/1CP

Theory and Computer Program for Transfer Function Identification by the GRAM Identifier with Application to Undersea Vehicles
AD-A050 206/2CP

Depot Maintenance Planning and Programming System (DMPPS): Volume 2 - Preprocessor Subsystem
AD-A054 238/1CP

Depot Maintenance Planning and Programming System (DMPPS). Volume 3. Alterations Subsystem
AD-A056 798/2CP

The Frank Close-Fit Ship-Motion Computer Program.
AD-709 072/CP

Computer Aided Input/Output for Use with the Finite Element Method of Structural Analysis.
AD-713 887/CP

Computer Programs for Plate Vibration Including the Effects of Clamped and Rotational Boundaries and Cylindrical Curvature-Option 2
AD-724 642/CP

A Program to Calculate the Pressure Distribution on a Hydrofoil with Pod and Strut
AD-727 588/CP

User's Manual for Propeller Noise Detectability Program
AD-729 435/CP

Methods for Computing Fluid Loading and the Vibratory Response of Fluid-Loaded Finite Rectangular Plates Subject to Turbulence Excitation--Option 3
AD-737 203/CP

Program SCORES - Ship Structural Response in Waves
AD-752 468/CP

Tanker Transverse Strength Analysis Programmer's Manual
AD-752 742/CP

Tanker Longitudinal Strength Analysis: User's Manual and Computer Program
AD-752 770/CP

Program 'TRANSHIP' - A Computer Program for the Design of the Midship Section of a Transversely-Framed Dry Cargo Ship. Part II
AD-753 531/CP

A Fortran IV Program for Computing the Static Deflections of Structural Cable
AD-767 309/8CP

FLSTAB: Recreational Small Boat Flooded Stability Program
AD-767 428/6CP

Computer Programs for the Digitizing and Using of Library Tapes of Ship Stress and Environment Data
AD-768 863/3CP

Theoretical Analysis of Cycloidal Propellers. Part II. Program Manual
AD-768 911/0CP

Vessel Safety Model. Volume III. Programmers' Manual
AD-773 587/1CP

Buoy-Cable Dynamics Program. Computer Program Documentation Report
COM-72-10866/CP

A Study of Hydraulic Jet Propulsion in a Destroyer
N71-30339/CP

COMPUTER SOFTWARE

Software Management for Shipboard Computer Systems
AD-A035 161/9CP

COMPUTERIZED SIMULATION

Control of Nuclear Propulsion Plant Power Transients
AD-A012 458/6CP

Sensitivity Study of the XR-3 Loads and Motions Computer Program Sidewall Parameters and Forces on Roll Behavior in Calm Sea and a Comparison to Testcraft Turn Maneuver Data
AD-A042 176/8CP

Investigation of a Linear, Two-Degree-of-Freedom Simulation of the XR-3 Captured Air Bubble (CAB) Craft in the Frequency Domain
AD-A044 325/9CP

Vessel Safety Model. Volume II. Users' Manual
AD-773 586/3CP

Vessel Safety Model. Volume III. Programmers' Manual
AD-773 587/1CP

CONTAINERSHIPS

Theoretical Estimates of Wave Loads on the SL-7 Container Ship in Regular and Irregular Seas
AD-A004 554/2CP

CONTRACTS

A Computer Model to Assess Financing Provisions of Naval FPIF Shipbuilding Contracts
AD-A018 914/2CP

CONTRAROTATING PROPELLERS

A Computer Program for the Preliminary Design of Contrarotating Propellers
AD-A030 709/0CP

CONTROL SIMULATORS

Microcomputer Based Pitch and Depth Controller for a Submarine Using Optimal Control Theory
AD-A030 081/4CP

CONTROL SURFACES

Design of the Stern Control Surfaces and Prediction of the Motions of the Dolly Varden Buoyant Rise Test Vehicle
AD-A040 311/3CP

CONTROL SYSTEMS

Development and Application of a Multiloop, Laplace Domain Analysis Technique to Control System Design for Underwater Vehicles
AD-A057 190/1CP

COST EFFECTIVENESS

Cost Effectiveness Study of Wastewater Management Systems for Selected U.S. Coast Guard Vessels. Volume II. Effectiveness Assessment of Candidate Systems
AD-A060 962/8CP

COUPLING (INTERACTION)

EMP Coupling Analysis for H.M.S. Sheffield
AD-A055 592/0CP

CREE COMPUTER PROGRAM

The Cutter Resource Effectiveness Evaluation (CREE) Program -- A Guide for Users and Analysts
AD-A053 644/1CP

CRUISERS

Ship Response Time History Predictions for a Conventional Preliminary CSGN Design
AD-A039 620/0CP

CSGN CLASS VESSELS

Ship Response Time History Predictions for a Conventional Preliminary CSGN Design
AD-A039 620/0CP

CYCLOIDAL PROPELLERS

Theoretical Analysis of Cycloidal Propellers. Part II. Program Manual
AD-768 911/0CP

CYLINDERS

Harmonic Motion of Cylinders in Uniform Flow
AD-A012 412/3CP

Nonlinear Hydrodynamic Forces on Floating Bodies
LA-UR-77-437

CYLINDRICAL SHELLS

Inelastic Response of Ring-Stiffened Cylindrical Shells to External Pressure Shock Waves
AD-A007 329/6CP

Far Field Sound Patterns from Anisotropic Cylindrical Shells under Lateral Point Loading at Low Frequencies
AD-735 133/CP

DATA BASES

Research on Computer Applications to Shipbuilding. Volume I. Final Report
COM-75-10929/8CP

Research on Computer Applications to Shipbuilding. Volume II. Catalog of Program Abstracts
COM-75-10930/6CP

DATA PROCESSING SYSTEMS

Case Studies in Computer Simulation.
AD-708 769/CP

DEEP SUBMERGENCE

A Method of Estimating the Sway Force and Rolling Moment on a Submarine Due to Differentially Deflected Sailplanes
AD-A019 101/5CP

DEEP SUBMERGENCE VEHICLES

Noise Reduction in Hydraulic Systems
AD-775 223/1CP

DEEP WATER

Mechanics of Cable Mooring Systems. Volume IV. A Computer Program for Analyzing the Steady State Response of Bi and Quad Cable Arrays
AD-786 184/2CP

Mechanics of Cable Mooring Systems. Volume VI. A Computer Program for Analyzing The Steady State Configuration of a Tri-Moored Array with Included Rigid and Deformable Members
AD-786 186/7CP

Mechanics of Cable Mooring Systems. Volume VII. The Steady-State Behavior of a Pyramid Array System
AD-786 187/5CP

Mechanics of Cable Mooring Systems. Volume VIII. The Dynamic Response of Cable Arrays Subject to Large Current Induced Displacements
AD-786 188/3CP

DEPOTS

Depot Maintenance SWBS System Initial Data Base
AD-A047 786/9CP

DESIGN CRITERIA

Port Design and Analysis Methodology. Appendix
COM-75-10345/7CP

DESTROYERS

Simulation of Maneuvering Characteristics of a Destroyer Study Ship Using a Modified Nonlinear Model
AD-783 034/2CP

DIGITAL SIMULATION

Simulation of a Controllable Reversible Pitch (C.R.P.) Propeller System
AD-A045 173/2CP

DISTILLING PLANTS

Investigation of Shipboard Distilling Plant Energy Consumption
AD-A009 804/6CP

DISTORTION

Analytic Modeling of Heat Flow and Structural Distortion in Ship Structures Produced by Welding
AD-A048 227/3CP

DOWNWASH

Computation of Periodic Propeller Forces in Non-Uniform Flows Using a Lifting Surface Model
AD-718 898/CP

DRAG

A Review of Resistance Prediction and Design Methods for Strut-Pod Inlets
AD-A052 710/1CP

DRAG REDUCTION

A Study of the Drag Characteristics and Polymer Diffusion in the Boundary Layer of an Axisymmetric Body
AD-A024 667/8CP

DYNAMIC LOADS

Theoretical Prediction of Dynamic Wave Loads on Small-Waterplane-Area, Twin-Hull Ships
AD-A042 563/7CP

SPAN: User's Summary. Addendum
AD-A047 021/1CP

DYNAMIC PRESSURE

Inelastic Response of Ring-Stiffened Cylindrical Shells to External Pressure Shock Waves
AD-A007 329/6CP

ECONOMIC ANALYSIS

A Computer Model to Assess Financing Provisions of Naval FPIF Shipbuilding Contracts
AD-A018 914/2CP

Shipbuilding Production Function: An Example of a Dynamic Production Function
AD-A031 223/1CP

EJECTION

A Study of the Drag Characteristics and Polymer Diffusion in the Boundary Layer of an Axisymmetric Body
AD-A024 667/8CP

ELECTROMAGNETIC INDUCTION

EMP Coupling Analysis for H.M.S. Sheffield
AD-A055 592/0CP

ELECTROMAGNETIC PULSES

EMP Coupling Analysis for H.M.S. Sheffield
AD-A055 592/0CP

ENERGY ABSORBERS

Performance Analysis of a Turbo-Type Energy Absorber for an Aircraft Carrier Arresting Gear
AD-728 682/CP

EXTRUSION

Properties of Combined Aluminum Tee Extrusion and Plate
AD-A031 490/6CP

FAIRINGS

Automatic Creation of Fair Ship Lines
AD-724 347/CP

SUBJECT INDEX

FAIRWATERS

Hydrodynamics of a Body of Revolution with Fairwater and Rudders at a Constant Angle of Attack
AD-A001 750/9CP

FALLING BODIES

Penetration of Free-Falling Objects into Deep-Sea Sediments
AD-741 140/CP

FATIGUE TESTS (MECHANICS)

A Study of Parameters That Influence Wire-Rope Fatigue Life
AD-A001 673/3CP

FEEDBACK CONTROL

The Analysis of a Longitudinal Control System for Underwater Vehicles
AD-A021 838/8CP

FINANCIAL MANAGEMENT

Long Range Fleet Planning Study Vessel Configuration System (Trade Route 27). Volume I: Report
PB-286 655/6CP

Long Range Fleet Planning Study Vessel Configuration System (Trade Route 27) Volume II: Appendix
PB-286 656/4CP

FINANCING

A Computer Model to Assess Financing Provisions of Naval FPIF Shipbuilding Contracts
AD-A018 914/2CP

FINITE ELEMENT ANALYSIS

Data Generation for Finite-Element Structural Analysis of Three-Dimensional Naval Ship Structures
AD-A014 125/9CP

Interactive Graphics Software for Use in Finite Element Analysis
AD-776 263/6CP

FIXED PRICE CONTRACTS

A Computer Model to Assess Financing Provisions of Naval FPIF Shipbuilding Contracts
AD-A018 914/2CP

FIXED PRICE INCENTIVE FEE

A Computer Model to Assess Financing Provisions of Naval FPIF Shipbuilding Contracts
AD-A018 914/2CP

FLAPS (CONTROL SURFACES)

Comparison of Computer Predicted and Experimentally Determined Leading Edge Cavitation of a Foil with Flaps
AD-A015 874/1CP

FLEXURAL PROPERTIES

Ship Motion and Flexure Data Base for the CG-26
AD-A046 877/7CP

FLOATING DOCKS

The Motion of Floating Advanced Base Components in Shoal Water -- A Comparison between Theory and Field Test Data
AD-A007 489/8CP

FLOATS

Investigation of the Performance of Personal Flotation Devices
AD-A017 101/7CP

FLOW DISTRIBUTION

Improved Marine Boiler Reliability. Phase II. Volume III. Superheater Air Flow Model Tests
PB-281 654/4CP

FLOW STREAMLINE

Calculation of Streamlines on the USNS DUTTON
AD-A040 713/0CP

FLUID FLOW

Harmonic Motion of Cylinders in Uniform Flow
AD-A012 412/3CP

Computation of the Velocity Potential for a Pulsating Source in a Fluid with Free Surface and Finite Depth
AD-A039 491/6CP

Momentum Theory of a Propeller in a Shear Flow
AD-A050 777/2CP

FORWARD AREAS

The Motion of Floating Advanced Base Components in Shoal Water -- A Comparison between Theory and Field Test Data
AD-A007 489/8CP

FRIGATES

Computerized Programs for Improving Overhaul Planning
AD-A051 809/2CP

Assessment of Patrol Frigate Maintenance Policy. Computer Simulation of a Rotatable Pool for the PF
AD-761 159/CP

GAMMA DENSITY FUNCTIONS

Computer Program for Estimation of Extreme Values Based on the Generalized Gamma Distribution
AD-A030 090/5CP

GAS TURBINES

Application of Cycloidal Cam Type Speed Reducers to Marine Gas Turbine Engines
AD-754 822/CP

GRILLES

SPAN: A Computer Program for Static and Dynamic Analysis of Stiffened Plates and Grillages
AD-A026 865/6CP

SPAN: User's Summary. Addendum
AD-A047 021/1CP

GROUND EFFECT MACHINES

Turning Characteristics of the Bell 100 Ton Surface Effect Ship
AD-767 680/2CP

GUIDED MISSILE SHIPS

Ship Response Time History Predictions for a Conventional Preliminary CSGN Design
AD-A039 620/0CP

HANDLING

A Simulation of a Computer Graphics-Aided Aircraft Handling System
AD-A012 418/0CP

HARBORS

Vessel Safety Model. Volume II. Users' Manual
AD-773 586/3CP

Vessel Safety Model. Volume III. Programmers' Manual
AD-773 587/1CP

HEAT TRANSFER

A Feasibility Study of Heat Transfer Improvement in Marine Steam Condensers
AD-A048 783/5CP

HEAT TRANSMISSION

Analytic Modeling of Heat Flow and Structural Distortion in Ship Structures Produced by Welding
AD-A048 227/3CP

HEAVING

Determination of Damping Coefficients of Swath Catamaran Using Thin Ship Theory
AD-A041 293/4CP

HOISTS

Mark I Deep Dive System (Dds-1) Handling Study. Phase I. Conceptual Design.
AD-712 546/CP

HULLS (MARINE)

Numerical Calculation of the Added Mass and Damping Coefficients of Cylinders Oscillating in or Below a Free Surface
AD-722 690/CP

Penetration Reinforcement Design for Spherical Pressure Hulls
AD-728 772/CP

LODCAP - Recreational Small Boat Live Load Capacity Computer Program
AD-747 790/CP

Structural Synthesis of Frame Reinforced Submersible, Circular, Cylindrical Hulls
AD-763 400/CP

HYBRID SHIPS

Powering Prediction for Various Hybrid Ship Concepts
AD-A030 530/0CP

HYDRAULIC EQUIPMENT

Noise Reduction in Hydraulic Systems
AD-775 223/1CP

A Study of Hydraulic Jet Propulsion in a Destroyer
N71-30339/CP

HYDRAULIC JETS

Recommended Vehicle Concepts for Waterjet Propelled High-Performance Vehicles
AD-A004 621/9CP

Hydrodynamic Performance of the Model of a Variable Area Waterjet Inlet Designed for a 200 Ton, 100 Knot Hydrofoil Ship
AD-A038 590/6CP

A Study of Hydraulic Jet Propulsion in a Destroyer
N71-30339/CP

HYDRAULIC SERVOMECHANISMS

Simulation of a Controllable Reversible Pitch (C.R.P.) Propeller System
AD-A045 173/2CP

HYDRODYNAMIC CODES

The Midcohv Weight and Balance Computer Program (WTBAL)
AD-A001 279/9CP

HYDRODYNAMIC COEFFICIENTS

Prediction of Acceleration Hydrodynamic Coefficients for Underwater Vehicles from Geometric Parameters
AD-A052 718/4CP

HYDRODYNAMIC CONFIGURATIONS

A Review of Resistance Prediction and Design Methods for Strut-Pod Inlets
AD-A052 710/1CP

HYDRODYNAMIC CONTROL SURFACES

A Lifting-Surface Program for Trapezoidal Control Surfaces with Flaps
AD-785 247/8CP

HYDRODYNAMICS

Hydrodynamics of a Body of Revolution with Fairwater and Rudders at a Constant Angle of Attack
AD-A001 750/9CP

Unsteady Hydrodynamics of a Body of Revolution with Fairwater and Rudder
AD-A003 009/8CP

The Simulation of Hydrofoil Performance
AD-A005 463/5CP

Extraction of Stability Derivative Values from Test Data Taken on Undersea Vehicles - A Computerized Method
AD-A016 813/8CP

A Method of Estimating the Sway Force and Rolling Moment on a Submarine Due to Differentially Deflected Sailplanes
AD-A019 101/5CP

Heave and Roll Response of Free Floating Bodies of Cylindrical Shape
AD-A038 215/0CP

Computation of the Velocity Potential for a Pulsating Source in a Fluid with Free Surface and Finite Depth
AD-A039 491/6CP

Prediction of Acceleration Hydrodynamic Coefficients for Underwater Vehicles from Geometric Parameters
AD-A052 718/4CP

An Experimental Investigation of Wall Effects on Supercavitating Hydrofoils of Finite Span
AD-A056 090/4CP

The Unsteady Hydrodynamics and Control of Hydrofoils Near a Free Surface.
AD-717 681/CP

Experimental Procedure for the Determination of Wave Resistance in a Towing Tank
AD-733 683/CP

The Deterministic Evaluation of Ship Motion Impulse Response Functions
AD-749 962/CP

Computer Aided Prediction of Seakeeping Performance in Ship Design
COM-71-00590/CP

Barge Trains in a Coastal Seaway. Part II. Predictions of Lateral Motions and Bending Moments
COM-71-00788/CP

HYDROFOIL BOATS

Automatic Control Systems for Longitudinal Motion of Semisubmerged Ships
AD-752 007/CP

HYDROFOIL CRAFT

Recommended Vehicle Concepts for Waterjet Propelled High-Performance Vehicles
AD-A004 621/9CP

The Simulation of Hydrofoil Performance
AD-A005 463/5CP

Hydrofoil Analysis and Design Program (HANDE)
AD-A005 487/4CP

Hydrofoil Analysis and Design Program (HANDE)
AD-A005 488/2CP

Hydrodynamic Performance of the Model of a Variable Area Waterjet Inlet Designed for a 200 Ton, 100 Knot Hydrofoil Ship
AD-A038 590/6CP

Hullborne Hydrofoil Six-Degree of Freedom Motion Prediction Computer Program
AD-A044 220/2CP

Simulation of Hydrofoil Performance in Calm Water
AD-772 876/9CP

Divergence Analysis of Swept Hydrofoils-Computer Program (SWDIVRG)
AD-779 844/0CP

HYDROFOILS

Comparison of Computer Predicted and Experimentally Determined Leading Edge Cavitation of a Foil with Flaps
AD-A015 874/1CP

A Numerical Method for Two-Dimensional, Cavitating, Lifting Flows
AD-A016 953/2CP

Computer Program Description for Supercavitating Hydrofoil Section Design According to Linearized Theory
AD-A018 241/0CP

Powering Prediction for Various Hybrid Ship Concepts
AD-A030 530/0CP

Non Linear Calculation of Supercavitating Hydrofoils Near a Free Surface
AD-A032 789/0CP

Design Implementation for Supercavitating Hydrofoils with Two-Point Cavity Thickness Control
AD-A046 534/4CP

An Experimental Investigation of Wall Effects on Supercavitating Hydrofoils of Finite Span
AD-A056 090/4CP

Lifting Line Calculations for Hydrofoil Performance at Arbitrary Froude Number and Submergence. Part 1. Fixed Shape Elliptical Circulation Distribution
AD-A058 533/1CP

The Unsteady Hydrodynamics and Control of Hydrofoils Near a Free Surface.
AD-717 681/CP

A Program to Calculate the Pressure Distribution on a Hydrofoil with Pod and Strut
AD-727 588/CP

Transverse Gravity Effects on a Fully Cavitating Hydrofoil Running Below a Free Surface
AD-746 484/CP

Numerical Computations of Supercavitating Hydrofoils on Parabolic Shape with Wu and Wang's Exact Method
AD-763 465/CP

Divergence Analysis of Swept Hydrofoils-Computer Program (SWDIVRG)
AD-779 844/0CP

Comprehensive Evaluation of Six Thin-Wing Lifting-Surface Computer Programs
AD-785 228/8CP

HYDROSTATICS

Hydrostatics and Equilibrium Characteristics Computer Program for Recreational Boats
AD-A033 609/9CP

FLSTAB: Recreational Small Boat Flooded Stability Program
AD-767 428/6CP

IMPACT ACCELERATION

Computer Solution of Accelerations Caused by Collision. Volume I. Report
PB-283 211/1CP

Sectional Property Tabulations for Computer Solution ofAccelerations Caused by Collision. Volume II
PB-283 212/9CP

IMPELLERS

Computer-Assisted Design of Pump Impellers
AD-A050 187/4CP

INCENTIVE CONTRACTS

A Computer Model to Assess Financing Provisions of Naval FPIF Shipbuilding Contracts
AD-A018 914/2CP

INDUSTRIAL PRODUCTION

Shipbuilding Production Function: An Example of a Dynamic Production Function
AD-A031 223/1CP

INFORMATION RETRIEVAL

A Vessel Inspection Information System
AD-A047 165/6CP

INLETS

Hydrodynamic Performance of the Model of a Variable Area Waterjet Inlet Designed for a 200 Ton, 100 Knot Hydrofoil Ship
AD-A038 590/6CP

INSPECTION

A Vessel Inspection Information System
AD-A047 165/6CP

INSTRUCTION MANUALS

User's Manual for Propeller Noise Detectability Program
AD-729 435/CP

INTERACTIVE GRAPHICS

Interactive Parameter Analysis Program (IPAP) - User's Manual
AD-A029 796/0CP

Interactive Graphics Software for Use in Finite Element Analysis
AD-776 263/6CP

INTERMEDIATE MAINTENANCE

Assessment of Patrol Frigate Maintenance Policy. Computer Simulation of a Rotatable Pool for the PF
AD-761 159/CP

INTERNAL WAVES

Submarine Effects Engineering Code. 4. Operating Instructions
AD-A018 789/8CP

INVENTORY CONTROL

An Analysis of the Ships Parts Control Center Inventory Model and a Possible Alternative Model
AD-A046 508/8CP

INVISCID FLOW

Submarine Effects Engineering Code. 4. Operating Instructions
AD-A018 789/8CP

User's Manual for a FORTRAN IV Computer Program for Calculating Propeller/Stern Boundary-Layer Interaction on Axisymmetric Bodies
AD-A037 063/5CP

IPAP COMPUTER PROGRAM

Interactive Parameter Analysis Program (IPAP) - User's Manual
AD-A029 796/0CP

JOB SHOP SCHEDULING

Depot Maintenance Planning and Programming System (DMPPS). Volume 5. Synthesizer Subsystem
AD-A053 956/9CP

LAMINAR BOUNDARY LAYER

A Study of the Drag Characteristics and Polymer Diffusion in the Boundary Layer of an Axisymmetric Body
AD-A024 667/8CP

LANDING CRAFT

LX Synthesis Model Hullform Development - Normalized Bonjean Curves
AD-A029 795/2CP

LEADING EDGES

Comparison of Computer Predicted and Experimentally Determined Leading Edge Cavitation of a Foil with Flaps
AD-A015 874/1CP

LIFE JACKETS

Investigation of the Performance of Personal Flotation Devices
AD-A017 101/7CP

LIFE RAFTS

Experiments in Small Craft Leeway
AD-A055 321/4CP

LIFT FANS

Refinements of the Seal Subroutines and Fan Air Flow Maps for the XR-3 Loads and Motion Program
AD-A004 616/9CP

LIFTING LINE

A Lifting Line Computer Program for Preliminary Design of Propellers
AD-A030 720/7CP

LIFTING SURFACES

Hydrodynamics of a Body of Revolution with Fairwater and Rudders at a Constant Angle of Attack
AD-A001 750/9CP

Comprehensive Evaluation of Six Thin-Wing Lifting-Surface Computer Programs
AD-785 228/8CP

LITTORAL TRANSPORT

Effect of Large Nearshore Structures on Wave Motion in the Vicinity of the Structure and Adjacent Coast
AD-A016 969/8CP

LOAD CAPACITY

LODCAP - Recreational Small Boat Live Load Capacity Computer Program
AD-747 790/CP

LOADING (MECHANICS)

Methods for Computing Fluid Loading and the Vibratory Response of Fluid-Loaded Finite Rectangular Plates Subject to Turbulence Excitation--Option 3
AD-737 203/CP

LOGISTICS

Maneuvering Control of Replenishment at Sea
AD-756 548/CP

LOGISTICS MANAGEMENT

Establishment of Reliability and Maintainability Data Bank for Shipboard Machinery. Volume 1
AD-A054 499/9CP

Establishment of Reliability and Maintainability Data Bank for Shipboard Machinery. Volume II
AD-A054 500/4CP

Assessment of Patrol Frigate Maintenance Policy. Computer Simulation of a Rotatable Pool for the PF
AD-761 159/CP

LOSS OF COOLANT

Hydrogen Suppression Study and Testing of Halon 1301. Phase III
PB-278 911/3CP

MAINTENANCE

Depot Maintenance SWBS System Initial Data Base
AD-A047 786/9CP

MAINTENANCE MANAGEMENT

Computerized Programs for Improving Overhaul Planning
AD-A051 809/2CP

Depot Maintenance Planning and Programming System (DMPPS). Volume 5. Synthesizer Subsystem
AD-A053 956/9CP

Depot Maintenance Planning and Programming System (DMPPS): Volume 2 - Preprocessor Subsystem
AD-A054 238/1CP

Establishment of Reliability and Maintainability Data Bank for Shipboard Machinery. Volume 1
AD-A054 499/9CP

Establishment of Reliability and Maintainability Data Bank for Shipboard Machinery. Volume II
AD-A054 500/4CP

Depot Maintenance Planning and Programming System (DMPPS). Volume 3. Alterations Subsystem
AD-A056 798/2CP

MAN COMPUTER INTERFACE

Human and Computer Control of Undersea Teleoperators
AD-A057 655/3CP

MAN MACHINE SYSTEMS

Human and Computer Control of Undersea Teleoperators
AD-A057 655/3CP

MANAGEMENT INFORMATION SYSTEMS

A Shipboard Report Origination System Utilizing a Microcomputer
AD-A038 811/6CP

MANAGEMENT PLANNING AND CONTROL

Depot Maintenance Planning and Programming System (DMPPS). Volume 3. Alterations Subsystem
AD-A058 798/2CP

MANEUVERS

Maneuvering Characteristics of Automatically Controlled Ships with Directionally Unstable Hulls
AD-A003 788/7CP

MANIPULATORS

Human and Computer Control of Undersea Teleoperators
AD-A057 655/3CP

MARINE BOILERS

Multivariable Control of a Marine Boiler
AD-A061 282/0CP

MARINE ENGINEERING

Computational Methods in Ship Hydrodynamics
AD-A022 305/7CP

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 6
AD-A025 709/7CP

Interactive Graphics Software for Use in Finite Element Analysis
AD-776 263/6CP

Computer Programs in Marine Science
PB-258 082/7CP

MARINE ENGINES

Computer-Assisted Design of Pump Impellers
AD-A050 187/4CP

MARINE NUCLEAR PROPULSION

Hydrogen Suppression Study and Testing of Halon 1301. Phase III
PB-278 911/3CP

MARINE PROPULSION

Control of Nuclear Propulsion Plant Power Transients
AD-A012 458/6CP

Powering Prediction for Various Hybrid Ship Concepts
AD-A030 530/0CP

A Computer Program for the Preliminary Design of Contrarotating Propellers
AD-A030 709/0CP

Trade-Off Analysis of Propulsion Systems for Submersibles (TAPSS)
AD-A056 617/4CP

Multivariable Control of a Marine Boiler
AD-A061 282/0CP

Cryogenic Systems and Superconductive Power
AD-758 431/CP

A Study of Hydraulic Jet Propulsion in a Destroyer
N71-30339/CP

Improved Marine Boiler Reliability. Phase II. Volume III. Superheater Air Flow Model Tests
PB-281 654/4CP

MARINE RUDDERS

A Lifting-Surface Program for Trapezoidal Control Surfaces with Flaps
AD-785 247/8CP

MARINE SURFACE PROPULSION

Recommended Vehicle Concepts for Waterjet Propelled High-Performance Vehicles
AD-A004 621/9CP

Marine Steam Condenser Design Using Numerical Optimization
AD-A049 953/3CP

Application of Cycloidal Cam Type Speed Reducers to Marine Gas Turbine Engines
AD-754 822/CP

MECHANICAL CABLES

Mooring Mechanics - A Comprehensive Computer Study. Volume I. Three Dimensional Static Analysis and Design of Single Point Taut and Slack Moored Buoy Systems. Part I. Surface Mooring Lines. Part II. Subsurface Mooring Lines
AD-771 367/0CP

Mechanics of Cable Mooring Systems. Volume IV. A Computer Program for Analyzing the Steady State Response of Bi and Quad Cable Arrays
AD-786 184/2CP

Mechanics of Cable Mooring Systems. Volume VI. A Computer Program for Analyzing The Steady State Configuration of a Tri-Moored Array with Included Rigid and Deformable Members
AD-786 186/7CP

Mechanics of Cable Mooring Systems. Volume VII. The Steady-State Behavior of a Pyramid Array System
AD-786 187/5CP

Mechanics of Cable Mooring Systems. Volume VIII. The Dynamic Response of Cable Arrays Subject to Large Current Induced Displacements
AD-786 188/3CP

MERCHANT SHIPS

Calculation of Releases of Radioactive Materials in Gaseous Effluents from Nuclear-Powered Merchant Ships (NMS-GEFF Code)
PB-283 045/3CP

MERCHANT VESSELS

A Vessel Inspection Information System
AD-A047 165/6CP

METAL BENDING

An Automated Bending System for the Fabrication of Ship Frames via Self - Adaptive Computer Control
PB-265 805/2CP

METHANE/BROMO-TRIFLUORO

Hydrogen Suppression Study and Testing of Halon 1301. Phase III
PB-278 911/3CP

MICROCOMPUTERS

A Shipboard Report Origination System Utilizing a Microcomputer
AD-A038 811/6CP

MOORING

Dynamic Analysis of a Single Point, Taut, Compound Mooring
AD-727 633/CP

A Fortran IV Program for Computing the Static Deflections of Structural Cable
AD-767 309/8CP

Mooring Mechanics - A Comprehensive Computer Study. Volume I. Three Dimensional Static Analysis and Design of Single Point Taut and Slack Moored Buoy Systems. Part I. Surface Mooring Lines. Part II. Subsurface Mooring Lines
AD-771 367/0CP

Mechanics of Cable Mooring Systems. Volume IV. A Computer Program for Analyzing the Steady State Response of Bi and Quad Cable Arrays
AD-786 184/2CP

Mechanics of Cable Mooring Systems. Volume VI. A Computer Program for Analyzing The Steady State Configuration of a Tri-Moored Array with Included Rigid and Deformable Members
AD-786 186/7CP

Mechanics of Cable Mooring Systems. Volume VII. The Steady-State Behavior of a Pyramid Array System
AD-786 187/5CP

Mechanics of Cable Mooring Systems. Volume VIII. The Dynamic Response of Cable Arrays Subject to Large Current Induced Displacements
AD-786 188/3CP

MOORING BUOYS

Dynamic Analysis of a Single Point, Taut, Compound Mooring
AD-727 633/CP

Computer Programs for the Static Analysis of Single Point Moored Surface and Subsurface Buoy Systems
AD-761 164/CP

Mooring Mechanics - A Comprehensive Computer Study. Volume I. Three Dimensional Static Analysis and Design of Single Point Taut and Slack Moored Buoy Systems. Part I. Surface Mooring Lines. Part II. Subsurface Mooring Lines
AD-771 367/0CP

MOORING CABLES

Mechanics of Cable Mooring Systems. Volume IV. A Computer Program for Analyzing the Steady State Response of Bi and Quad Cable Arrays
AD-786 184/2CP

Mechanics of Cable Mooring Systems. Volume VI. A Computer Program for Analyzing The Steady State Configuration of a Tri-Moored Array with Included Rigid and Deformable Members
AD-786 186/7CP

Mechanics of Cable Mooring Systems. Volume VII. The Steady-State Behavior of a Pyramid Array System
AD-786 187/5CP

Mechanics of Cable Mooring Systems. Volume VIII. The Dynamic Response of Cable Arrays Subject to Large Current Induced Displacements
AD-786 188/3CP

MOORING LINES

Mooring Mechanics - A Comprehensive Computer Study. Volume I. Three Dimensional Static Analysis and Design of Single Point Taut and Slack Moored Buoy Systems. Part I. Surface Mooring Lines. Part II. Subsurface Mooring Lines
AD-771 367/0CP

MOORINGS

Computer Programs for the Static Analysis of Single Point Moored Surface and Subsurface Buoy Systems
AD-761 164/CP

MOTION

The Frank Close-Fit Ship-Motion Computer Program.
AD-709 072/CP

MULTIPLE PURPOSE PORTS

Port Design and Analysis Methodology. Appendix
COM-75-10345/7CP

MULTIPORTS

Port Design and Analysis Methodology. Appendix
COM-75-10345/7CP

NASTRAN COMPUTER PROGRAM

Proceedings of the Navy-NASTRAN Colloquium (3rd) Held at Naval Ship Research and Development Center, Washington, D.C., 22-23 Mar 72
AD-764 299/CP

NAVAL ARCHITECTURE

Interactive Parameter Analysis Program (IPAP) (User's Manual) (Revision)
AD-A052 151/8CP

NAVAL SHORE FACILITIES

Naval Shipyard Performance Evaluation
AD-785 188/4CP

NAVAL VESSELS

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 1
AD-A025 704/8CP

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 6
AD-A025 709/7CP

NAVAL VESSELS (COMBATANT)

A Method of Efficiently Calculating the Temperature Distribution History in Structural Elements Exposed to the Thermal Radiation Pulse of a Nuclear Weapon Explosion
AD-753 462/CP

Maneuvering Control of Replenishment at Sea
AD-756 548/CP

Simulation of the Compatibility of an Air Capable Ship and a VTOL Aircraft
AD-764 865/2CP

NAVIGATIONAL AIDS

U. S. Coast Guard Moored Buoy Data Handling and Analysis
AD-A035 686/5CP

NOISE REDUCTION

Noise Reduction in Hydraulic Systems
AD-775 223/1CP

NONLINEAR ANALYSIS

Non Linear Calculation of Supercavitating Hydrofoils Near a Free Surface
AD-A032 789/0CP

NUCLEAR EXPLOSION DAMAGE

A Method of Efficiently Calculating the Temperature Distribution History in Structural Elements Exposed to the Thermal Radiation Pulse of a Nuclear Weapon Explosion
AD-753 462/CP

NUCLEAR EXPLOSIONS

A Method of Efficiently Calculating the Temperature Distribution History in Structural Elements Exposed to the Thermal Radiation Pulse of a Nuclear Weapon Explosion
AD-753 462/CP

NUCLEAR POWERED SHIPS

Calculation of Releases of Radioactive Materials in Gaseous Effluents from Nuclear-Powered Merchant Ships (NMS-GEFF Code)
PB-283 045/3CP

Computer Solution of Accelerations Caused by Collision. Volume I. Report
PB-283 211/1CP

Sectional Property Tabulations for Computer Solution ofAccelerations Caused by Collision. Volume II
PB-283 212/9CP

The Development and Validation of a Mathematical Model for the Design of Protection Barriers for Nuclear Powered Ships
PB-284 174/0CP

Input Data Instructions - Simplified Documentation of the Computer Program ANSYS
PB-284 193/0CP

NUCLEAR POWERED VESSELS

A Study of Berthing Arrangements for Nuclear Submarines at the New London Submarine Base
AD-811 927/CP

NUCLEAR PROPULSION

Control of Nuclear Propulsion Plant Power Transients
AD-A012 458/6CP

NUCLEAR REACTOR ACCIDENTS

Hydrogen Suppression Study and Testing of Halon 1301. Phase III
PB-278 911/3CP

NUCLEAR REACTOR CONTAINMENT

Hydrogen Suppression Study and Testing of Halon 1301. Phase III
PB-278 911/3CP

NUMERICAL ANALYSIS

Computer Programs for Plate Vibration Including the Effects of Clamped and Rotational Boundaries and Cylindrical Curvature-Option 2
AD-724 642/CP

A Program to Calculate the Pressure Distribution on a Hydrofoil with Pod and Strut
AD-727 588/CP

OCEAN BOTTOM

Penetration of Free-Falling Objects into Deep-Sea Sediments
AD-741 140/CP

OCEAN WAVES

Theoretical Estimates of Wave Loads on the SL-7 Container Ship in Regular and Irregular Seas
AD-A004 554/2CP

Prediction of Ship Motions in Regular and Irregular Head Waves
AD-A008 349/3CP

The Pien Wavemaking Resistance Computation Program Part I. Theoretical Basis and Programming Technique
AD-A013 194/6CP

Comparative Seakeeping Characteristics of Two United States Coast Guard Patrol Boats in Regular Waves
AD-A015 951/7CP

Effect of Large Nearshore Structures on Wave Motion in the Vicinity of the Structure and Adjacent Coast
AD-A016 969/8CP

Prediction of Ship Responses in Long-Crested Irregular Waves (Computer Program SRIW)
AD-A033 339/3CP

Analytical Ship Residuary Resistance Prediction
AD-A051 322/6CP

Laboratory Modelling of Structural Response to Ocean Wave Excitation
AD-743 069/CP

Development of a Time Domain Simulation for Ship Capsizing in following Waves
AD-770 330/9CP

A Hybrid Element Method for Calculating Three-Dimensional Water Wave Scattering
PB-262 040/9CP

OCEANOGRAPHY

Computer Programs in Marine Science
PB-258 082/7CP

OFFSHORE

Effect of Large Nearshore Structures on Wave Motion in the Vicinity of the Structure and Adjacent Coast
AD-A016 969/8CP

OFFSHORE STRUCTURES

Effect of Large Nearshore Structures on Wave Motion in the Vicinity of the Structure and Adjacent Coast
AD-A016 969/8CP

A Hybrid Element Method for Calculating Three-Dimensional Water Wave Scattering
PB-262 040/9CP

Discrete Element Analysis and Its Experimental Verification for Pile Foundations Supporting Offshore Structures Under Dynamic Lateral Loads
PB-262 154/8CP

OIL POLLUTION CONTROL

Preliminary Analysis of Tanker Collisions and Groundings
AD-757 175/CP

OPERATIONAL READINESS

Carrier Aircraft Operational Compatibility System (CAOCS - MOD 2) Computer Program
AD-732 755/CP

PARAMETRIC ANALYSIS

Mechanics of Cable Mooring Systems. Volume IV. A Computer Program for Analyzing the Steady State Response of Bi and Quad Cable Arrays
AD-786 184/2CP

Mechanics of Cable Mooring Systems. Volume VI. A Computer Program for Analyzing The Steady State Configuration of a Tri-Moored Array with Included Rigid and Deformable Members
AD-786 186/7CP

Mechanics of Cable Mooring Systems. Volume VII. The Steady-State Behavior of a Pyramid Array System
AD-786 187/5CP

Mechanics of Cable Mooring Systems. Volume VIII. The Dynamic Response of Cable Arrays Subject to Large Current Induced Displacements
AD-786 188/3CP

PATROL CRAFT

Comparative Seakeeping Characteristics of Two United States Coast Guard Patrol Boats in Regular Waves
AD-A015 951/7CP

PERFORMANCE (ENGINEERING)

Water-Augmented Vehicle (WAVE) Study - Phase I. Appendix I: Model I Computer Program and Computer Output
AD-772 385/1CP

PERSONAL FLOTATION DEVICES

Investigation of the Performance of Personal Flotation Devices
AD-A017 101/7CP

PFD (PERSONAL FLOTATION DEVICES)

Investigation of the Performance of Personal Flotation Devices
AD-A017 101/7CP

PIERS

A Study of Berthing Arrangements for Nuclear Submarines at the New London Submarine Base
AD-811 927/CP

PILE FOUNDATIONS

Discrete Element Analysis and Its Experimental Verification for Pile Foundations Supporting Offshore Structures Under Dynamic Lateral Loads
PB-262 154/8CP

PIPING SYSTEMS

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 1
AD-A025 704/8CP

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 2
AD-A025 705/5CP

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 3
AD-A025 706/3CP

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 4
AD-A025 707/1CP

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 5
AD-A025 708/9CP

Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 6
AD-A025 709/7CP

PLATING

Properties of Combined Aluminum Tee Extrusion and Plate
AD-A031 490/6CP

POLYMERS

A Study of the Drag Characteristics and Polymer Diffusion in the Boundary Layer of an Axisymmetric Body
AD-A024 667/8CP

POWER

Control of Nuclear Propulsion Plant Power Transients
AD-A012 458/6CP

POWER TRANSIENTS

Control of Nuclear Propulsion Plant Power Transients
AD-A012 458/6CP

PREPROCESSING

Depot Maintenance Planning and Programming System (DMPPS): Volume 2 - Preprocessor Subsystem
AD-A054 238/1CP

PRESSURE DISTRIBUTION

A Program to Calculate the Pressure Distribution on a Hydrofoil with Pod and Strut
AD-727 588/CP

PRESSURE VESSELS

Pressure Hull Optimization Using General Instability Equations Admitting More than One Longitudinal Buckling Half-Wave
AD-768 368/3CP

PROGRAMMING (COMPUTERS)

Computer Programs for Statistical Analysis of Extreme-Value Strain Data
AD-719 938/CP

User's Manual for the Modified Finite Element Program FINEL
AD-723 212/CP

An Analysis of the Benefits Obtained Using the NAVSHIPS Cabling/Wiring (WIRES) Computer Program for Ship Overhaul Projects
AD-725 146/CP

Transient Response Calculation in the Frequency Domain with General Bending Response Program (GBRP)
AD-725 505/CP

User's Manual for Propeller Noise Detectability Program
AD-729 435/CP

A Computer Program for Analysis of Stiffened Plates Under Combined inplane and Lateral Loads
AD-735 936/CP

Three Dimensional Supertanker Computer Programs
AD-743 743/CP

Structural Analysis of Longitudinally Framed Ships
AD-752 769/CP

Proceedings of the Navy-NASTRAN Colloquium (3rd) Held at Naval Ship Research and Development Center, Washington, D.C., 22-23 Mar 72
AD-764 299/CP

A Graphics Oriented Interactive Finite Element Time Sharing Package (GIFTS)
AD-767 330/4CP

PROGRAMMING MANUALS

User's Manual for a FORTRAN IV Computer Program for Calculating Propeller/Stern Boundary-Layer Interaction on Axisymmetric Bodies
AD-A037 063/5CP

Interactive Parameter Analysis Program (IPAP) (User's Manual) (Revision)
AD-A052 151/8CP

PROPELLER BLADES

Computation of Periodic Propeller Forces in Non-Uniform Flows Using a Lifting Surface Model
AD-718 898/CP

PROPELLER HUBS

Propeller-Hub Interference Effects Using an Approximate Lifting Surface Theory
AD-A047 565/7CP

PROPELLER NOISE

Noise Detectability Prediction Method for Low Tip Speed Propellers
AD-729 432/CP

User's Manual for Propeller Noise Detectability Program
AD-729 435/CP

PROPELLERS (AERIAL)

Calculation of Inlet Flows by Means of a Closed Vorticity Distribution Applied to Ducted Propellers
AD-754 114/CP

PROPELLERS (MARINE)

Computerization of the Mean Streamline Blade Design Method
AD-A011 089/0CP

A Computer Program for the Preliminary Design of Contrarotating Propellers
AD-A030 709/0CP

A Lifting Line Computer Program for Preliminary Design of Propellers
AD-A030 720/7CP

Ship Propulsion Shafting Bearing Reaction Programs MGE2 and MGE5 for IBM 7090 (with notes on Univac LARC)
AD-A041 797/2CP

Propeller-Hub Interference Effects Using an Approximate Lifting Surface Theory
AD-A047 565/7CP

Momentum Theory of a Propeller in a Shear Flow
AD-A050 777/2CP

Computation of Periodic Propeller Forces in Non-Uniform Flows Using a Lifting Surface Model
AD-718 898/CP

Noise Detectability Prediction Method for Low Tip Speed Propellers
AD-729 432/CP

User's Manual for Propeller Noise Detectability Program
AD-729 435/CP

Calculation of Inlet Flows by Means of a Closed Vorticity Distribution Applied to Ducted Propellers
AD-754 114/CP

Stress Analysis of Complex Ship Components by a Numerical Procedure Using Curved Finite Elements
AD-765 712/5CP

PUMPS

Computer-Assisted Design of Pump Impellers
AD-A050 187/4CP

RADIOACTIVE CONTAMINANTS

Calculation of Releases of Radioactive Materials in Gaseous Effluents from Nuclear-Powered Merchant Ships (NMS-GEFF Code)
PB-283 045/3CP

RADIOACTIVE EFFLUENTS

Calculation of Releases of Radioactive Materials in Gaseous Effluents from Nuclear-Powered Merchant Ships (NMS-GEFF Code)
PB-283 045/3CP

RECREATIONAL BOATING

Capsizing/Swamping Accident Investigations for 1974 Season. Volume I. Research Report
AD-A015 142/3CP

Capsizing/Swamping Accident Investigations for 1974 Season. Volume II. Appendices B-U
AD-A018 568/6CP

Recreational Boat Developmental Test Program Developmental Testing. Volume II. Tests, Methods and Reports
AD-769 872/3CP

RECREATIONAL BOATS

Hydrostatics and Equilibrium Characteristics Computer Program for Recreational Boats
AD-A033 609/9CP

RECREATIONAL VESSELS

LODCAP - Recreational Small Boat Live Load Capacity Computer Program
AD-747 790/CP

REFRIGERATION SYSTEMS

Cryogenic Systems and Superconductive Power
AD-758 431/CP

REFUELING

Maneuvering Control of Replenishment at Sea
AD-756 548/CP

REINFORCED PLASTICS

Experimental Determination of Strain Concentrations near an Unreinforced Hole in Orthotropic Shells
AD-767 046/6CP

REMOTE CONTROL

Human and Computer Control of Undersea Teleoperators
AD-A057 655/3CP

REPAIR

Computerized Programs for Improving Overhaul Planning
AD-A051 809/2CP

REPLENISHMENT

Multivariable Systems Design: A Two Ships Controller for Replenishment at Sea
AD-781 861/0CP

REPLENISHMENT AT SEA

Maneuvering Control of Replenishment at Sea
AD-756 548/CP

Multivariable Systems Design: A Two Ships Controller for Replenishment at Sea
AD-781 861/0CP

RESEARCH SHIPS

Design of the Stern Control Surfaces and Prediction of the Motions of the Dolly Varden Buoyant Rise Test Vehicle
AD-A040 311/3CP

RESIDUAL STRESS

A Computer Program for Calculation of the Residual Stress Distribution and the Effective Stress-Strain Curve of Cold-Formed Structural Members
AD-A034 996/9CP

RING STIFFENED CYLINDERS

Inelastic Response of Ring-Stiffened Cylindrical Shells to External Pressure Shock Waves
AD-A007 329/6CP

SAFETY

Capsizing/Swamping Accident Investigations for 1974 Season. Volume I. Research Report
AD-A015 142/3CP

Capsizing/Swamping Accident Investigations for 1974 Season. Volume II. Appendices B-U
AD-A018 568/6CP

SALVAGE

Penetration of Free-Falling Objects into Deep-Sea Sediments
AD-741 140/CP

SCHEDULING

Long Range Planning System/Workload Graph Interface Programs
AD-A059 772/4CP

An Aid for the Allocation of Resources in Ship Repairs at Naval Shipyards
AD-787 370/6CP

SCOURING

Effect of Large Nearshore Structures on Wave Motion in the Vicinity of the Structure and Adjacent Coast
AD-A016 969/8CP

SEA CONTROL SHIPS

Simulation of the Compatibility of an Air Capable Ship and a VTOL Aircraft
AD-764 865/2CP

SEA RESCUE EQUIPMENT

Mark I Deep Dive System (Dds-1) Handling Study. Phase I. Conceptual Design.
AD-712 546/CP

SUBJECT INDEX

SEAKEEPING

Comparative Seakeeping Characteristics of Two United States Coast Guard Patrol Boats in Regular Waves
AD-A015 951/7CP

A Methodology for Quantifying the Operational Effects of Ship Seakeeping Characteristics
AD-A045 443/9CP

PHHS. A Fortran Programme for Ship Pitch, Heave and Seakeeping Prediction
AD-A056 554/9CP

Multivariable Systems Design: A Two Ships Controller for Replenishment at Sea
AD-781 861/0CP

Computer Aided Prediction of Seakeeping Performance in Ship Design
COM-71-00590/CP

Barge Trains in a Coastal Seaway. Part II. Predictions of Lateral Motions and Bending Moments
COM-71-00788/CP

SEAPORTS

Port Design and Analysis Methodology. Appendix
COM-75-10345/7CP

SEEK COMPUTER PROGRAM

Submarine Effects Engineering Code. 4. Operating Instructions
AD-A018 789/8CP

SEWAGE TREATMENT

Cost Effectiveness Study of Wastewater Management Systems for Selected U.S. Coast Guard Vessels. Volume II. Effectiveness Assessment of Candidate Systems
AD-A060 962/8CP

SHAFTS (MACHINE ELEMENTS)

An Updated Guide to the Use of General Bending Response Program (GBRP)
AD-A015 948/3CP

Ship Propulsion Shafting Bearing Reaction Programs MGE2 and MGE5 for IBM 7090 (with notes on Univac LARC)
AD-A041 797/2CP

SHEAR PROPERTIES

Momentum Theory of a Propeller in a Shear Flow
AD-A050 777/2CP

SHELLS (STRUCTURAL FORMS)

Inelastic Response of Ring-Stiffened Cylindrical Shells to External Pressure Shock Waves
AD-A007 329/6CP

SHIP AUXILIARY EQUIPMENT

Investigation of Shipboard Distilling Plant Energy Consumption
AD-A009 804/6CP

Establishment of Reliability and Maintainability Data Bank for Shipboard Machinery. Volume 1
AD-A054 499/9CP

Establishment of Reliability and Maintainability Data Bank for Shipboard Machinery. Volume II
AD-A054 500/4CP

An Analysis of the Benefits Obtained Using the NAVSHIPS Cabling/Wiring (WIRES) Computer Program for Ship Overhaul Projects
AD-725 146/CP

SHIP DECKS

Establishment of Reliability and Maintainability Data Bank for Shipboard Machinery. Volume 1
AD-A054 499/9CP

Establishment of Reliability and Maintainability Data Bank for Shipboard Machinery. Volume II
AD-A054 500/4CP

SHIP DESIGN

Interactive Parameter Analysis Program (IPAP) - User's Manual
AD-A029 796/0CP

Assessment of Ship Dynamics Programs for Possible Integration into the Integrated Ship Design System
AD-A043 174/2CP

Structural Synthesis Design Program
AD-A048 162/2CP

Marine Steam Condenser Design Using Numerical Optimization
AD-A049 953/3CP

SHIP DYNAMICS

Assessment of Ship Dynamics Programs for Possible Integration Into the Integrated Ship Design System
AD-A043 174/2CP

SHIP GROUNDINGS

Vessel Safety Model. Volume II. Users' Manual
AD-773 586/3CP

Vessel Safety Model. Volume III. Programmers' Manual
AD-773 587/1CP

SHIP HULLS

The Pien Wavemaking Resistance Computation Program Part I. Theoretical Basis and Programming Technique
AD-A013 194/6CP

The Pien Wavemaking Resistance Computation Program. Part 2. Users Manual
AD-A013 218/3CP

Sound Radiation from an Orthotropic Plate Supported by a Double Set of Stiffeners
AD-A013 320/7CP

Data Generation for Finite-Element Structural Analysis of Three-Dimensional Naval Ship Structures
AD-A014 125/9CP

A Computer Program for Plotting the Cellular Structure of Ships
AD-A015 334/6CP

Results of Exercising a Synthesis Routine for Small Waterplane Area Twin Hull (SWATH) Ships and Comparison with Model Experiments
AD-A018 560/3CP

Vibratory Response and Acoustical Radiation of a Water-Loaded, Turbulence-Excited Plate-Cavity System--Option 6
AD-A020 437/0CP

LX Synthesis Model Hullform Development - Normalized Bonjean Curves
AD-A029 795/2CP

Powering Prediction for Various Hybrid Ship Concepts
AD-A030 530/0CP

Calculation of Streamlines on the USNS DUTTON
AD-A040 713/0CP

Theoretical Prediction of Dynamic Wave Loads on Small-Waterplane-Area, Twin-Hull Ships
AD-A042 563/7CP

Assessment of Ship Dynamics Programs for Possible Integration into the Integrated Ship Design System
AD-A043 174/2CP

A Computer Program for Structural Response to Ship Slamming (SLAM)
AD-A046 266/3CP

Ship Motion and Flexure Data Base for the CG-26
AD-A046 877/7CP

Analytical Ship Residuary Resistance Prediction
AD-A051 322/6CP

Computer Programs for Statistical Analysis of Extreme-Value Strain Data
AD-719 938/CP

User's Manual for the Modified Finite Element Program FINEL
AD-723 212/CP

Automatic Creation of Fair Ship Lines
AD-724 347/CP

Transient Response Calculation in the Frequency Domain with General Bending Response Program (GBRP)
AD-725 505/CP

Experimental Procedure for the Determination of Wave Resistance in a Towing Tank
AD-733 683/CP

Prediction of Three-Dimensional Pressure Distributions of V-Shaped Prismatic Wedges during Impact or Planing
AD-739 328/CP

Impulsive Response of a Stiffened Plate Mass Loaded Around the Edges
AD-742 086/CP

Methods for Computing Radiation Damping and the Vibratory Response of Fluid Loaded and Acoustically Radiating Finite Rectangular Plates Subject to Turbulence Excitation - Option 4
AD-746 460/CP

Program SCORES - Ship Structural Response in Waves
AD-752 468/CP

Tanker Transverse Strength Analysis Programmer's Manual
AD-752 742/CP

Structural Analysis of Longitudinally Framed Ships
AD-752 769/CP

Tanker Longitudinal Strength Analysis: User's Manual and Computer Program
AD-752 770/CP

Correlation of Model and Full-Scale Results in Predicting Wave Bending Moment Trends
AD-753 223/CP

The Development and Validation of a Mathematical Model for the Design of Protection Barriers for Nuclear Powered Ships
PB-284 174/0CP

Input Data Instructions - Simplified Documentation of the Computer Program ANSYS
PB-284 193/0CP

Stabilization of High Aspect Ratio Beams During Bending for Use as Ship Frames. Part III
PB-287 095/4CP

SHIP MANEUVERING

Simulation of Maneuvering Characteristics of a Destroyer Study Ship Using a Modified Nonlinear Model
AD-783 034/2CP

SHIP MANEUVERS

Maneuvering Characteristics of Automatically Controlled Ships with Directionally Unstable Hulls
AD-A003 788/7CP

SHIP MODELS

Results of Exercising a Synthesis Routine for Small Waterplane Area Twin Hull (SWATH) Ships and Comparison with Model Experiments
AD-A018 560/3CP

SHIP MOTION

The Motion of Floating Advanced Base Components in Shoal Water -- A Comparison between Theory and Field Test Data
AD-A007 489/8CP

Manual: NSRDC Ship-Motion and Sea-Load Computer Program
AD-A008 335/2CP

Prediction of Ship Motions in Regular and Irregular Head Waves
AD-A008 349/3CP

Study of the Roll and Pitch Transients in Calm Water Using the Simulated Performance of the XR-3 Surface Effect Ship Loads and Motions Computer Program
AD-A021 832/1CP

Determination of Damping Coefficients of Swath Catamaran Using Thin Ship Theory
AD-A031 293/4CP

Prediction of Ship Responses in Long-Crested Irregular Waves (Computer Program SRIW)
AD-A033 339/3CP

Manual for Mono-Hull or Twin-Hull Ship Motion Prediction Computer Program
AD-A038 061/8CP

Computation of the Velocity Potential for a Pulsating Source in a Fluid with Free Surface and Finite Depth
AD-A039 491/6CP

Structural Seaworthiness Digital Computer Program ROSAS (A Conversion from Seaworthiness Analog Computer)
AD-A039 510/3CP

Ship Response Time History Predictions for a Conventional Preliminary CSGN Design
AD-A039 620/0CP

Hullborne Hydrofoil Six-Degree of Freedom Motion Prediction Computer Program
AD-A044 220/2CP

A Methodology for Quantifying the Operational Effects of Ship Seakeeping Characteristics
AD-A045 443/9CP

Ship Motion and Flexure Data Base for the CG-26
AD-A046 877/7CP

PHHS. A Fortran Programme for Ship Pitch, Heave and Seakeeping Prediction
AD-A056 554/9CP

The Deterministic Evaluation of Ship Motion Impulse Response Functions
AD-749 962/CP

Development of a Time Domain Simulation for Ship Capsizing in following Waves
AD-770 330/9CP

Vessel Safety Model. Volume II. Users' Manual
AD-773 588/3CP

Vessel Safety Model. Volume III. Programmers' Manual
AD-773 587/1CP

SHIP PLATES

Considerations for the Structural Detailing of Aluminum Ships. Guidelines for the Conversion of CASDOS
AD-A001 377/1CP

Vibratory Response and Acoustical Radiation of a Water-Loaded, Turbulence-Excited Plate-Cavity System--Option 6
AD-A020 437/0CP

SPAN: A Computer Program for Static and Dynamic Analysis of Stiffened Plates and Grillages
AD-A026 865/6CP

SPAN: User's Summary. Addendum
AD-A047 021/1CP

Computer Programs for Plate Vibration Including the Effects of Clamped and Rotational Boundaries and Cylindrical Curvature-Option 2
AD-724 642/CP

Post-Buckling Behavior of Stiffened Plates with Small Initial Curvature under Combined Loads
AD-728 455/CP

A Computer Program for Analysis of Stiffened Plates Under Combined inplane and Lateral Loads
AD-735 936/CP

Methods for Computing Fluid Loading and the Vibratory Response of Fluid-Loaded Finite Rectangular Plates Subject to Turbulence Excitation--Option 3
AD-737 203/CP

Impulsive Response of a Stiffened Plate Mass Loaded Around the Edges
AD-742 086/CP

SHIP STRUCTURAL COMPONENTS

SPAN: A Computer Program for Static and Dynamic Analysis of Stiffened Plates and Grillages
AD-A026 865/6CP

SPAN: User's Summary. Addendum
AD-A047 021/1CP

Structural Synthesis Design Program
AD-A048 162/2CP

Analytic Modeling of Heat Flow and Structural Distortion in Ship Structures Produced by Welding
AD-A048 227/3CP

Computer Aided Input/Output for Use with the Finite Element Method of Structural Analysis.
AD-713 887/CP

Experimental and Theoretical Studies of Hull-Deckhouse Interaction - 2-Level Deckhouse
AD-740 818/CP

Data Generator for the Idealization for Finite Element Structural Analysis of Naval Ship Flat Plated Grillages with Multiple Openings
AD-743 055/CP

Effect of Shell Extensional Vibration on Hull Shock Response
AD-751 040/CP

A Method of Efficiently Calculating the Temperature Distribution History in Structural Elements Exposed to the Thermal Radiation Pulse of a Nuclear Weapon Explosion
AD-753 462/CP

Interactive Graphics Software for Use in Finite Element Analysis
AD-776 263/6CP

SHIPBUILDING

Considerations for the Structural Detailing of Aluminum Ships. Guidelines for the Conversion of CASDOS
AD-A001 377/1CP

A Computer Model to Assess Financing Provisions of Naval FPIF Shipbuilding Contracts
AD-A018 914/2CP

Shipbuilding Production Function: An Example of a Dynamic Production Function
AD-A031 223/1CP

Long Range Planning System/Workload Graph Interface Programs
AD-A059 772/4CP

Research on Computer Applications to Shipbuilding. Volume I. Final Report
COM-75-10929/8CP

Research on Computer Applications to Shipbuilding. Volume II. Catalog of Program Abstracts
COM-75-10930/6CP

An Automated Bending System for the Fabrication of Ship Frames via Self - Adaptive Computer Control
PB-265 805/2CP

Computer-Aided Preliminary Design of Ships
PB-286 238/1CP

Stabilization of High Aspect Ratio Beams During Bending for Use as Ship Frames. Part III
PB-287 095/4CP

SHIPS

Forced Vibration Calculation Using General Bending Response Program (GBRP) and the Fast Fourier Transform
AD-A001 682/4CP

Maneuvering Characteristics of Automatically Controlled Ships with Directionally Unstable Hulls
AD-A003 788/7CP

Refinements of the Seal Subroutines and Fan Air Flow Maps for the XR-3 Loads and Motion Program
AD-A004 616/9CP

An Analysis of the Ships Parts Control Center Inventory Model and a Possible Alternative Model
AD-A046 508/8CP

Depot Maintenance SWBS System Initial Data Base
AD-A047 786/9CP

The Frank Close-Fit Ship-Motion Computer Program.
AD-709 072/CP

Motion of a Ship at the Free Surface.
AD-717 609/CP

An Analysis of the Benefits Obtained Using the NAVSHIPS Cabling/Wiring (WIRES) Computer Program for Ship Overhaul Projects
AD-725 146/CP

The Deterministic Evaluation of Ship Motion Impulse Response Functions
AD-749 962/CP

Preliminary Analysis of Tanker Collisions and Groundings
AD-757 175/CP

Ditigal Computer Simulation for Surface Ship Control
AD-764 480/CP

A Graphics Oriented Interactive Finite Element Time Sharing Package (GIFTS)
AD-767 330/4CP

Factors Influencing Ship Repair Part Consumption
AD-767 675/2CP

Turning Characteristics of the Bell 100 Ton Surface Effect Ship
AD-767 680/2CP

Development of a Time Domain Simulation for Ship Capsizing in following Waves
AD-770 330/9CP

SOLVEDG, An Out-of-Core System Solver for Large Order Positive Definite Systems of Linear Equations
AD-770 618/7CP

Computer Aided Prediction of Seakeeping Performance in Ship Design
COM-71-00590/CP

The Nonlinear Dynamics ot Cable Systems
COM-73-11532/1CP

SHIPYARDS

Depot Maintenance SWBS System Initial Data Base
AD-A047 786/9CP

Depot Maintenance Planning and Programming System (DMPPS). Volume 5. Synthesizer Subsystem
AD-A053 956/9CP

Depot Maintenance Planning and Programming System (DMPPS): Volume 2 - Preprocessor Subsystem
AD-A054 238/1CP

Depot Maintenance Planning and Programming System (DMPPS). Volume 3. Alterations Subsystem
AD-A056 798/2CP

Long Range Planning System/Workload Graph Interface Programs
AD-A059 772/4CP

Naval Shipyard Performance Evaluation
AD-785 188/4CP

An Aid for the Allocation of Resources in Ship Repairs at Naval Shipyards
AD-787 370/6CP

SHOCK ABSORBERS

Performance Analysis of a Turbo-Type Energy Absorber for an Aircraft Carrier Arresting Gear
AD-728 682/CP

SIMPLY SUPPORTED PLATES

Vibratory Response and Acoustical Radiation of a Water-Loaded, Turbulence-Excited Plate-Cavity System--Option 6
AD-A020 437/0CP

SLAM COMPUTER PROGRAM

A Computer Program for Structural Response to Ship Slamming (SLAM)
AD-A046 266/3CP

SLAMMING IMPACT

Prediction of Three-Dimensional Pressure Distributions ot V-Shaped Prismatic Wedges during Impact or Planing
AD-739 328/CP

SOLAR SEA POWER PLANTS

On the Minimization of the Ocean Thermal Differences Machine Vehicle Sea Motions
PB-247 176/1CP

SPAR BUOYS

Heave and Roll Response of Free Floating Bodies of Cylindrical Shape
AD-A038 215/0CP

Experimental Studies of the Behavior of Spar Type Stable Platforms in Waves.
AD-715 662/CP

SPARE PARTS

An Analysis of the Ships Parts Control Center Inventory Model and a Possible Alternative Model
AD-A046 508/8CP

Factors Influencing Ship Repair Part Consumption
AD-767 675/2CP

SPEED REGULATORS

Application of Cycloidal Cam Type Speed Reducers to Marine Gas Turbine Engines
AD-754 822/CP

SPHERICAL SHELLS

Inelastic Buckling ot a Deep Spherical Shell Subject to External Pressure
AD-764 085/CP

STATIC LOADS

SPAN: User's Summary. Addendum
AD-A047 021/1CP

STATIC STRUCTURAL ANALYSIS

SOLVEDG, An Out-of-Core System Solver for Large Order Positive Definite Systems of Linear Equations
AD-770 618/7CP

STATISTICAL FUNCTIONS

Computer Program for Estimation of Extreme Values Based on the Generalized Gamma Distribution
AD-A030 090/5CP

STEAM CONDENSERS

A Feasibility Study of Heat Transfer Improvement in Marine Steam Condensers
AD-A048 783/5CP

Marine Steam Condenser Design Using Numerical Optimization
AD-A049 953/3CP

STIFFENED CYLINDERS

Extended Structural Synthesis Capability for Automated Design of Frame-Stiffened, Submersible, Circular, Cylindrical Shells
AD-768 021/8CP

STIFFENED PLATES

A Computer Program for Analysis of Stiffened Plates Under Combined inplane and Lateral Loads
AD-735 936/CP

STRATIFIED FLOW

Turbulent Wakes in a Stratified Fluid. Part I: Model Development, Verification, and Sensitivity to Initial Conditions
AD-A012 873/6CP

Turbulent Wakes in a Stratified Fluid. Part II: User's Summary Guide to 'Wake' Computer Program
AD-A012 874/4CP

STRESS ANALYSIS

Microcomputer Application to Compute a Ship's Draft and Longitudinal Stress
AD-A038 810/8CP

STRESSES

Computer Programs for the Digitizing and Using of Library Tapes of Ship Stress and Environment Data
AD-768 863/3CP

STRUCTURAL ANALYSIS

Data Generation for Finite-Element Structural Analysis of Three-Dimensional Naval Ship Structures
AD-A014 125/9CP

Data Generator for the Idealization for Finite Element Structural Analysis of Naval Ship Flat Plated Grillages with Multiple Openings
AD-743 055/CP

Proceedings ot the Navy-NASTRAN Colloquium (3rd) Held at Naval Ship Research and Development Center, Washington, D.C., 22-23 Mar 72
AD-764 299/CP

STRUCTURAL DESIGN

Structural Synthesis of Frame Reinforced Submersible, Circular, Cylindrical Hulls
AD-763 400/CP

STRUCTURAL MEMBERS

A Computer Program for Calculation of the Residual Stress Distribution and the Effective Stress-Strain Curve of Cold-Formed Structural Members
AD-A034 996/9CP

STRUCTURAL PARTS

User's Manual for the Modified Finite Element Program FINEL
AD-723 212/CP

STRUCTURAL PROPERTIES

Computer Aided Input/Output for Use with the Finite Element Method of Structural Analysis.
AD-713 887/CP

A Graphics Oriented Interactive Finite Element Time Sharing Package (GIFTS)
AD-767 330/4CP

SOLVEDG, An Out-of-Core System Solver for Large Order Positive Definite Systems of Linear Equations
AD-770 618/7CP

STRUCTURAL RESPONSE

A Computer Program for Structural Response to Ship Slamming (SLAM)
AD-A046 266/3CP

Analytical Ship Residuary Resistance Prediction
AD-A051 322/6CP

STRUCTURAL SHELLS

Far Field Sound Patterns from Anisotropic Cylindrical Shells under Lateral Point Loading at Low Frequencies
AD-735 133/CP

Inelastic Buckling of a Deep Spherical Shell Subject to External Pressure
AD-764 085/CP

Experimental Determination of Strain Concentrations near an Unreintorced Hole in Orthotropic Shells
AD-767 046/6CP

Extended Structural Synthesis Capability tor Automated Design of Frame-Stiffened, Submersible, Circular, Cylindrical Shells
AD-768 021/8CP

STRUCTURES

Effect of Large Nearshore Structures on Wave Motion in the Vicinity of the Structure and Adjacent Coast
AD-A016 969/8CP

Laboratory Modelling of Structural Response to Ocean Wave Excitation
AD-743 069/CP

STRUTS

A Review of Resistance Prediction and Design Methods for Strut-Pod Inlets
AD-A052 710/1CP

SUBJECT INDEX

SUBMARINE HULLS

Unsteady Hydrodynamics of a Body of Revolution with Fairwater and Rudder
AD-A003 009/8CP

Far Field Sound Patterns from Anisotropic Cylindrical Shells under Lateral Point Loading at Low Frequencies
AD-735 133/CP

Optimal Design of Submersible Frame Stiffened, Circular, Cylindrical Hulls
AD-746 888/CP

Effect of Shell Extensional Vibration on Hull Shock Response
AD-751 040/CP

Optimal Design of Submersible Frame Stiffened, Circular Cylindrical Hulls
AD-761 643/CP

SUBMARINES

Turbulent Wakes in a Stratified Fluid. Part I: Model Development, Verification, and Sensitivity to Initial Conditions
AD-A012 873/6CP

Turbulent Wakes in a Stratified Fluid. Part II: User's Summary Guide to 'Wake' Computer Program
AD-A012 874/4CP

A Method of Estimating the Sway Force and Rolling Moment on a Submarine Due to Differentially Deflected Sailplanes
AD-A019 101/5CP

Microcomputer Based Pitch and Depth Controller for a Submarine Using Optimal Control Theory
AD-A030 081/4CP

The Development of a Computer-Aided Conceptual Submarine Design Evaluation Tool
AD-771 448/8CP

A Study of Berthing Arrangements for Nuclear Submarines at the New London Submarine Base
AD-811 927/CP

SUBMERSIBLES

Hydrodynamics of a Body of Revolution with Fairwater and Rudders at a Constant Angle of Attack
AD-A001 750/9CP

Trade-Off Analysis of Propulsion Systems for Submersibles (TAPSS)
AD-A056 617/4CP

SUPERCAVITATING HYDROFOILS

Computer Program Description for Supercavitating Hydrofoil Section Design According to Linearized Theory
AD-A018 241/0CP

An Experimental Investigation of Wall Effects on Supercavitating Hydrofoils of Finite Span
AD-A056 090/4CP

Numerical Computations of Supercavitating Hydrofoils on Parabolic Shape with Wu and Wang's Exact Method
AD-763 465/CP

SUPERHEATERS

Improved Marine Boiler Reliability. Phase II. Volume III. Superheater Air Flow Model Tests
PB-281 654/4CP

SUPERTANKERS

Computer Solution of Accelerations Caused by Collision. Volume I. Report
PB-283 211/1CP

Sectional Property Tabulations for Computer Solution ofAccelerations Caused by Collision. Volume II
PB-283 212/9CP

SUPPLY AFLOAT

Multivariable Systems Design: A Two Ships Controller for Replenishment at Sea
AD-781 861/0CP

SUPPLY DEPOTS

Depot Maintenance Planning and Programming System (DMPPS). Volume 3. Alterations Subsystem
AD-A056 798/2CP

SURFACE EFFECT SHIPS

Recommended Vehicle Concepts for Waterjet Propelled High-Performance Vehicles
AD-A004 621/9CP

Wave Resistance of Asymmetric Pressure Distributions Moving in a Canal
AD-A005 650/7CP

Study of the Roll and Pitch Transients in Calm Water Using the Simulated Performance of the XR-3 Surface Effect Ship Loads and Motions Computer Program
AD-A021 832/1CP

A Study of Pressure-Volume Rates and Plenum Membrane Additions to the Captured Air Bubble Surface Effect Ship XR-3 Digital Computer Loads and Motion Program
AD-A026 397/0CP

Powering Prediction for Various Hybrid Ship Concepts
AD-A030 530/0CP

Properties of Combined Aluminum Tee Extrusion and Plate
AD-A031 490/6CP

Sensitivity Study of the XR-3 Loads and Motions Computer Program Sidewall Parameters and Forces on Roll Behavior in Calm Sea and a Comparison to Testcraft Turn Maneuver Data
AD-A042 176/8CP

Water-Augmented Vehicle (WAVE) Study - Phase I. Appendix I: Model I Computer Program and Computer Output
AD-772 385/1CP

XR-3 Surface Effects Ship Test Craft: A Mathematical Model and Simulation Program with Verification
AD-772 847/0CP

SURFACE NAVIGATION

Simulation of Maneuvering Characteristics of a Destroyer Study Ship Using a Modified Nonlinear Model
AD-783 034/2CP

SURFACE ROUGHNESS

An Analytical Study of the Effect of Surface Roughness on Boundary-Layer Stability
AD-A048 465/9CP

TANKERS

The Operational Capabilities of the Proposed Air Deliverable Anti-Pollution Transfer System (ADAPTS). Volume 2. Documentation of the Simulation Model, BAGSIM
AD-731 807/CP

Three Dimensional Supertanker Computer Programs
AD-743 743/CP

Maneuvering Control of Replenishment at Sea
AD-756 548/CP

Preliminary Analysis of Tanker Collisions and Groundings
AD-757 175/CP

Computer Solution of Accelerations Caused by Collision. Volume I. Report
PB-283 211/1CP

Sectional Property Tabulations for Computer Solution ofAccelerations Caused by Collision. Volume II
PB-283 212/9CP

TELEOPERATORS

Human and Computer Control of Undersea Teleoperators
AD-A057 655/3CP

TEMPERATURE DISTRIBUTION

A Method of Efficiently Calculating the Temperature Distribution History in Structural Elements Exposed to the Thermal Radiation Pulse of a Nuclear Weapon Explosion
AD-753 462/CP

TEST FACILITIES

Experimental Procedure for the Determination of Wave Resistance in a Towing Tank
AD-733 683/CP

THIN WINGS

Comprehensive Evaluation of Six Thin-Wing Lifting-Surface Computer Programs
AD-785 228/8CP

TOWING CABLES

Small-Perturbation Analysis of Oscillatory Tow-Cable Motion
AD-733 676/CP

The Configuration and Loading of a Torisonally Elastic Faired Cable
AD-768 319/6CP

The Nonlinear Dynamics of Cable Systems
COM-73-11532/1CP

TRADE OFF ANALYSES

Trade-Off Analysis of Propulsion Systems for Submersibles (TAPSS)
AD-A056 617/4CP

TRANSIENTS

Control of Nuclear Propulsion Plant Power Transients
AD-A012 458/6CP

TRIBRID SHIPS

Powering Prediction for Various Hybrid Ship Concepts
AD-A030 530/0CP

TURBOMACHINERY

Cryogenic Systems and Superconductive Power
AD-758 431/CP

TURBOREFRIGERATORS

Cryogenic Systems and Superconductive Power
AD-758 431/CP

TURBULENT FLOW

Turbulent Wakes in a Stratified Fluid. Part I: Model Development, Verification, and Sensitivity to Initial Conditions
AD-A012 873/6CP

Turbulent Wakes in a Stratified Fluid. Part II: User's Summary Guide to 'Wake' Computer Program
AD-A012 874/4CP

TURBULENT WAKE

Turbulent Wakes in a Stratified Fluid. Part I: Model Development, Verification, and Sensitivity to Initial Conditions
AD-A012 873/6CP

Turbulent Wakes in a Stratified Fluid. Part II: User's Summary Guide to 'Wake' Computer Program
AD-A012 874/4CP

UNDERWATER EXPLOSIONS

Inelastic Response of Ring-Stiffened Cylindrical Shells to External Pressure Shock Waves
AD-A007 329/6CP

UNDERWATER NAVIGATION

The Analysis of a Longitudinal Control System for Underwater Vehicles
AD-A021 838/8CP

UNDERWATER OBJECTS

Forces on a Horizontal Cylinder Due to Non-Linear Waves
AD-756 547/CP

A Fortran IV Program for Computing the Static Deflections of Structural Cable
AD-767 309/8CP

UNDERWATER SOUND

Noise Detectability Prediction Method for Low Tip Speed Propellers
AD-729 432/CP

User's Manual for Propeller Noise Detectability Program
AD-729 435/CP

UNDERWATER STRUCTURES

Forces on a Horizontal Cylinder Due to Non-Linear Waves
AD-756 547/CP

UNDERWATER VEHICLES

The Midcohv Weight and Balance Computer Program (WTBAL)
AD-A001 279/9CP

Extraction of Stability Derivative Values from Test Data Taken on Undersea Vehicles - A Computerized Method
AD-A016 813/8CP

Submarine Effects Engineering Code. 4. Operating Instructions
AD-A018 789/8CP

The Analysis of a Longitudinal Control System for Underwater Vehicles
AD-A021 838/8CP

An Analytical Study of the Effect of Surface Roughness on Boundary-Layer Stability
AD-A048 465/9CP

Theory and Computer Program for Transfer Function Identification by the GRAM Identifier with Application to Undersea Vehicles
AD-A050 206/2CP

Prediction of Acceleration Hydrodynamic Coefficients for Underwater Vehicles from Geometric Parameters
AD-A052 718/4CP

Development and Application of a Multiloop, Laplace Domain Analysis Technique to Control System Design for Underwater Vehicles
AD-A057 190/1CP

Human and Computer Control of Undersea Teleoperators
AD-A057 655/3CP

Mark I Deep Dive System (Dds-1) Handling Study. Phase I. Conceptual Design.
AD-712 546/CP

Penetration Reinforcement Design for Spherical Pressure Hulls
AD-728 772/CP

Structural Synthesis of Frame Reinforced Submersible, Circular, Cylindrical Hulls
AD-763 400/CP

Inelastic Buckling of a Deep Spherical Shell Subject to External Pressure
AD-764 085/CP

VARIABLE PITCH PROPELLERS

Simulation of a Controllable Reversible Pitch (C.R.P.) Propeller System
AD-A045 173/2CP

VERTICAL TAKE-OFF PLANES

Simulation of the Compatibility of an Air Capable Ship and a VTOL Aircraft
AD-764 865/2CP

VIBRATION

Forced Vibration Calculation Using General Bending Response Program (GBRP) and the Fast Fourier Transform
AD-A001 682/4CP

Harmonic Motion of Cylinders in Uniform Flow
AD-A012 412/3CP

Computer Programs for Plate Vibration Including the Effects of Clamped and Rotational Boundaries and Cylindrical Curvature-Option 2
AD-724 642/CP

Far Field Sound Patterns from Anisotropic Cylindrical Shells under Lateral Point Loading at Low Frequencies
AD-735 133/CP

VORTICES
Computation of Periodic Propeller Forces in Non-Uniform Flows Using a Lifting Surface Model
AD-718 898/CP

WAKE
Turbulent Wakes in a Stratified Fluid. Part I: Model Development, Verification, and Sensitivity to Initial Conditions
AD-A012 873/6CP

Turbulent Wakes in a Stratified Fluid. Part II: User's Summary Guide to 'Wake' Computer Program
AD-A012 874/4CP

The Pien Wavemaking Resistance Computation Program. Part 2. Users Manual
AD-A013 218/3CP

WASTE WATER
Cost Effectiveness Study of Wastewater Management Systems for Selected U.S. Coast Guard Vessels. Volume II. Effectiveness Assessment of Candidate Systems
AD-A060 962/8CP

WATER POLLUTION
The Operational Capabilities of the Proposed Air Deliverable Anti-Pollution Transfer System (ADAPTS). Volume 2. Documentation of the Simulation Model, BAGSIM
AD-731 807/CP

WAVEMAKING
The Pien Wavemaking Resistance Computation Program Part I. Theoretical Basis and Programming Technique
AD-A013 194/6CP

WAVES
Wave Resistance of Asymmetric Pressure Distributions Moving in a Canal
AD-A005 650/7CP

The Pien Wavemaking Resistance Computation Program. Part 2. Users Manual
AD-A013 218/3CP

WELDING
Analytic Modeling of Heat Flow and Structural Distortion in Ship Structures Produced by Welding
AD-A048 227/3CP

WELDMENTS
Development of Analytical and Empirical Systems for Parametric Studies of Design and Fabrication of Welded Structures
AD-A050 908/3CP

WIRE ROPE
A Study of Parameters That Influence Wire-Rope Fatigue Life
AD-A001 673/3CP

CORPORATE AUTHOR INDEX

AERONAUTICAL RESEARCH ASSOCIATES OF PRINCETON INC N J

ARAP-226-Pt-1
Turbulent Wakes in a Stratified Fluid. Part I: Model Development, Verification, and Sensitivity to Initial Conditions
AD-A012 873/6CP

ARAP-226-Pt-2
Turbulent Wakes in a Stratified Fluid. Part II: User's Summary Guide to 'Wake' Computer Program
AD-A012 874/4CP

AERONAUTICAL RESEARCH LABS., MELBOURNE (AUSTRALIA). DEPT. OF SUPPLY.

ARL-ME-316
A Study of Hydraulic Jet Propulsion in a Destroyer
N71-30339/CP

ALUMINUM CO OF AMERICA ALCOA CENTER PA ALCOA LABS

Considerations for the Structural Detailing of Aluminum Ships. Guidelines for the Conversion of CASDOS
AD-A001 377/1CP

ARINC RESEARCH CORP ANNAPOLIS MD

OE13-01-1-1224-VOL-1
Establishment of Reliability and Maintainability Data Bank for Shipboard Machinery. Volume 1
AD-A054 499/9CP

OE13-01-1-1224-VOL-2
Establishment of Reliability and Maintainability Data Bank for Shipboard Machinery. Volume II
AD-A054 500/4CP

ARIZONA STATE UNIV TEMPE DEPT OF MECHANICAL ENGINEERING

Noise Reduction in Hydraulic Systems
AD-775 223/1CP

ARIZONA UNIV TUCSON DEPT OF AEROSPACE AND MECHANICAL ENGINEERING

A Graphics Oriented Interactive Finite Element Time Sharing Package (GIFTS)
AD-767 330/4CP

ARIZONA UNIV TUCSON ENGINEERING EXPERIMENT STATION

Interactive Graphics Software for Use in Finite Element Analysis
AD-776 263/6CP

ATLANTIC RESEARCH CORP., ALEXANDRIA, VA. COMBUSTION TECHNOLOGY GROUP.

ARC-47-5702
Hydrogen Suppression Study and Testing of Halon 1301. Phase III
(MA-RD-920-78033)
PB-278 911/3CP

AUBURN UNIV ALA DEPT OF MECHANICAL ENGINEERING

The Development of a Computer-Aided Conceptual Submarine Design Evaluation Tool
AD-771 448/8CP

AVONDALE SHIPYARDS, INC., NEW ORLEANS, LA.

Research on Computer Applications to Shipbuilding. Volume I. Final Report
(MA-RD-930-75069-Vol-1)
COM-75-10929/8CP

Research on Computer Applications to Shipbuilding. Volume II. Catalog of Program Abstracts
(MA-RD-930-75069-Vol-2)
COM-75-10930/6CP

BATTELLE COLUMBUS LABS LONG BEACH CALIF LONG BEACH RESEARCH FACILITY

BATT-G-1689
A Study of Parameters That Influence Wire-Rope Fatigue Life
AD-A001 673/3CP

BATTELLE MEMORIAL INST COLUMBUS OHIO COLUMBUS LABS

Mark I Deep Dive System (Dds-1) Handling Study. Phase I. Conceptual Design.
AD-712 546/CP

BELL AEROSPACE NEW ORLEANS LA

Water-Augmented Vehicle (WAVE) Study - Phase I. Appendix I: Model I Computer Program and Computer Output
AD-772 385/1CP

BOEING CO SEATTLE WASH

D194-10043-1
EMP Coupling Analysis for H.M.S. Sheffield
AD-A055 592/0CP

D221-51302-1
Hydrofoil Analysis and Design Program (HANDE)
AD-A005 487/4CP

D321-51303-1
Hydrofoil Analysis and Design Program (HANDE)
AD-A005 488/2CP

BOLT BERANEK AND NEWMAN INC CAMBRIDGE MASS

BBN-1970
The Unsteady Hydrodynamics and Control of Hydrofoils Near a Free Surface.
AD-717 681/CP

BRADFORD NATIONAL CORP NY

Cost Effectiveness Study of Wastewater Management Systems for Selected U.S. Coast Guard Vessels. Volume II. Effectiveness Assessment of Candidate Systems
(USCG-D-74-77)
AD-A060 962/8CP

C-E MARINE POWER SYSTEMS, WINDSOR, CONN.

Improved Marine Boiler Reliability. Phase II. Volume III. Superheater Air Flow Model Tests
(MA-RD-920-77018)
PB-281 654/4CP

CADCOM INC ANNAPOLIS MD

CADCOM-73-6
Simulation of the Compatibility of an Air Capable Ship and a VTOL Aircraft
AD-764 865/2CP

CALIFORNIA INST OF TECH PASADENA DIV OF ENGINEERING AND APPLIED SCIENCE

E79A.15
Numerical Computations of Supercavitating Hydrofoils on Parabolic Shape with Wu and Wang's Exact Method
AD-763 465/CP

ENG-193-1
Non Linear Calculation of Supercavitating Hydrofoils Near a Free Surface
AD-A032 789/0CP

CALIFORNIA UNIV BERKELEY COLL OF ENGINEERING

NA-70-4
Experimental Studies of the Behavior of Spar Type Stable Platforms in Waves.
AD-715 662/CP

NA-71-4
Experimental and Theoretical Studies of Hull-Deckhouse Interaction - 2-Level Deckhouse
AD-740 818/CP

CALIFORNIA UNIV BERKELEY DIV OF STRUCTURAL ENGINEERING AND STRUCTURAL MECHANICS

UCSESM-71-4
A Computer Program for Analysis of Stiffened Plates Under Combined inplane and Lateral Loads
AD-735 936/CP

CALIFORNIA UNIV BERKELEY HYDRAULIC ENGINEERING LAB

HEL-1-22
Effect of Large Nearshore Structures on Wave Motion in the Vicinity of the Structure and Adjacent Coast
AD-A016 969/8CP

CALIFORNIA UNIV BERKELEY OPERATIONS RESEARCH CENTER

ORC-76-25
Shipbuilding Production Function: An Example of a Dynamic Production Function
AD-A031 223/1CP

CALIFORNIA UNIV LOS ANGELES SCHOOL OF ENGINEERING AND APPLIED SCIENCE

UCLA-ENG-7049
Case Studies in Computer Simulation.
AD-708 769/CP

CALIFORNIA UNIV., SAN DIEGO, LA JOLLA. INST. OF MARINE RESOURCES.

Sea Grant Pub-4
The Nonlinear Dynamics of Cable Systems
(NOAA-73090505)
COM-73-11532/1CP

UC-IMR-74-1
The Nonlinear Dynamics of Cable Systems
(NOAA-73090505)
COM-73-11532/1CP

CASE WESTERN RESERVE UNIV., CLEVELAND, OH. SCHOOL OF ENGINEERING.

Stabilization of High Aspect Ratio Beams During Bending for Use as Ship Frames. Part III
(NSF/RA-761596)
PB-287 095/4CP

CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO. SCHOOL OF ENGINEERING.

An Automated Bending System for the Fabrication of Ship Frames via Self - Adaptive Computer Control
(NSF/RA/T-73/075)
PB-265 805/2CP

CENTER FOR NAVAL ANALYSES ARLINGTON VA SYSTEMS EVALUATION GROUP

CRC-333
A Methodology for Quantifying the Operational Effects of Ship Seakeeping Characteristics
AD-A045 443/9CP

CHARLES STARK DRAPER LAB INC CAMBRIDGE MASS

R-1066-Vol-2
Mooring Mechanics. A Comprehensive Computer Study. Volume II. Three Dimensional Dynamic Analysis of Moored and Drifting Buoy Systems
AD-A038 248/1CP

CIVIL ENGINEERING LAB (NAVY) PORT HUENEME CALIF

CEL-TN-1371
The Motion of Floating Advanced Base Components in Shoal Water -- A Comparison between Theory and Field Test Data
AD-A007 489/8CP

COAST GUARD RESEARCH AND DEVELOPMENT CENTER GROTON CONN

CGR/DC-6/76
Hydrostatics and Equilibrium Characteristics Computer Program for Recreational Boats
(USCG-D-65-76)
AD-A033 609/9CP

COAST GUARD WASHINGTON D C

USCG-D-28-74
Development of a Time Domain Simulation for Ship Capsizing in following Waves
AD-770 330/9CP

The Operational Capabilities of the Proposed Air Deliverable Anti-Pollution Transfer System (ADAPTS). Volume 2. Documentation of the Simulation Model, BAGSIM
AD-731 807/CP

COAST GUARD WASHINGTON D C APPLIED TECHNOLOGY DIV

Preliminary Analysis of Tanker Collisions and Groundings
AD-757 175/CP

COAST GUARD WASHINGTON D C OCEANOGRAPHIC UNIT

CGOV-TR-77-2
Experiments in Small Craft Leeway
AD-A055 321/4CP

COM/CODE CORP ALEXANDRIA VA

Tanker Transverse Strength Analysis Programmer's Manual
(SSC-228)
AD-752 742/CP

Structural Analysis of Longitudinally Framed Ships
(SSC-225)
AD-752 769/CP

Tanker Longitudinal Strength Analysis: User's Manual and Computer Program
(SSC-226)
AD-752 770/CP

DAVID W TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER BETHESDA MD

DTNSRDC-76-0141
A Computer Program for Calculation of the Residual Stress Distribution and the Effective Stress-Strain Curve of Cold-Formed Structural Members
AD-A034 996/9CP

DTNSRDC-77-0001
Structural Seaworthiness Digital Computer Program ROSAS (A Conversion from Seaworthiness Analog Computer)
AD-A039 510/3CP

DTNSRDC-77-0032
Structural Synthesis Design Program
AD-A048 162/2CP

DTNSRDC-77-0061
Theoretical Prediction of Dynamic Wave Loads on Small-Waterplane-Area, Twin-Hull Ships
AD-A042 563/7CP

DTNSRDC-77-0114
Depot Maintenance SWBS System Initial Data Base
AD-A047 786/9CP

DTNSRDC-78/021
Depot Maintenance Planning and Programming System (DMPPS): Volume 2 - Preprocessor Subsystem
AD-A054 238/1CP

DTNSRDC-78/022
Depot Maintenance Planning and Programming System (DMPPS). Volume 3. Alterations Subsystem
AD-A056 798/2CP

DTNSRDC-78/024
Depot Maintenance Planning and Programming System (DMPPS). Volume 5. Synthesizer Subsystem
AD-A053 956/9CP

DTNSRDC-2976F
Vibratory Response and Acoustical Radiation of a Water-Loaded, Turbulence-Excited Plate-Cavity System--Option 6
AD-A020 437/0CP

DTNSRDC-4480
A Computer Program for Structural Response to Ship Slamming (SLAM)
AD-A046 266/3CP

NSRDC-4370
The Pien Wavemaking Resistance Computation Program Part I. Theoretical Basis and Programming Technique
AD-A013 194/6CP

NSRDC-4371
The Pien Wavemaking Resistance Computation Program. Part 2. Users Manual
AD-A013 218/3CP

NSRDC-4601
An Updated Guide to the Use of General Bending Response Program (GBRP)
AD-A015 948/3CP

NSRDC-4637
Data Generation for Finite-Element Structural Analysis of Three-Dimensional Naval Ship Structures
AD-A014 125/9CP

NSRDC-4648
A Computer Program for Plotting the Cellular Structure of Ships
AD-A015 334/6CP

DAVID W TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER BETHESDA MD COMPUTATION AND MATHEMATICS DEPT

CMD-7-75
Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 1
AD-A025 704/8CP

CMD-8-75
Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 2
AD-A025 705/5CP

CMD-9-75
Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 3
AD-A025 706/3CP

CMD-10-75
Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 4
AD-A025 707/1CP

CMD-11-75
Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 5
AD-A025 708/9CP

CMD-12-75
Engineering Analysis of the Piping Process for Naval Ship Design, Planning and Construction. Volume 6
AD-A025 709/7CP

CMD-12-76
LX Synthesis Model Hullform Development - Normalized Bonjean Curves
AD-A029 795/2CP

CMD-13-76
Interactive Parameter Analysis Program (IPAP) - User's Manual
AD-A029 796/0CP

CMD-76-17
Divider Design - An Extension of the Computer Graphics Arrangement Program (COGAP) User's/Systems Manual
AD-A030 569/8CP

DAVID W TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER BETHESDA MD COMPUTATION MATHEMATICS/LOGISTICS DEPT

CMD-76-22
Assessment of Ship Dynamics Programs for Possible Integration into the Integrated Ship Design System
AD-A043 174/2CP

CMLD-77-19
Interactive Parameter Analysis Program (IPAP) (User's Manual) (Revision)
AD-A052 151/8CP

DTNSRDC/CMLD-78/08
Long Range Planning System/Workload Graph Interface Programs
AD-A059 772/4CP

DAVID W TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER BETHESDA MD SHIP PERFORMANCE DEPT

DTNSRDC/SPD-0839-01
Lifting Line Calculations for Hydrofoil Performance at Arbitrary Froude Number and Submergence. Part 1. Fixed Shape Elliptical Circulation Distribution
AD-A058 533/1CP

SPD-326-06
Comparison of Computer Predicted and Experimentally Determined Leading Edge Cavitation of a Foil with Flaps
AD-A015 874/1CP

SPD-396-19
Results of Exercising a Synthesis Routine for Small Waterplane Area Twin Hull (SWATH) Ships and Comparison with Model Experiments
AD-A018 560/3CP

SPD-595-01
A Lifting Line Computer Program for Preliminary Design of Propellers
AD-A030 720/7CP

SPD-596-01
A Computer Program for the Preliminary Design of Contrarotating Propellers
AD-A030 709/0CP

SPD-632-10
A Method of Estimating the Sway Force and Rolling Moment on a Submarine Due to Differentially Deflected Sailplanes
AD-A019 101/5CP

SPD-635-01
Comparative Seakeeping Characteristics of Two United States Coast Guard Patrol Boats in Regular Waves
AD-A015 951/7CP

SPD-651-01
Computation of Loads Acting on the Cross-Structure and Struts of Twin Hull Ships in Beam Waves
AD-A027 862/2CP

SPD-652-01
Computation of the Velocity Potential for a Pulsating Source in a Fluid with Free Surface and Finite Depth
AD-A039 491/6CP

SPD-657-01
U. S. Coast Guard Moored Buoy Data Handling and Analysis
AD-A035 686/5CP

SPD-675-01
Powering Prediction for Various Hybrid Ship Concepts
AD-A030 530/0CP

SPD-686-02
Manual for Mono-Hull or Twin-Hull Ship Motion Prediction Computer Program
AD-A038 061/8CP

SPD-692-01
Computer Program for Estimation of Extreme Values Based on the Generalized Gamma Distribution
AD-A030 090/5CP

SPD-713-01
Hullborne Hydrofoil Six-Degree of Freedom Motion Prediction Computer Program
AD-A044 220/2CP

SPD-724-07
Ship Response Time History Predictions for a Conventional Preliminary CSGN Design
AD-A039 620/0CP

SPD-730-01
Prediction of Ship Responses in Long-Crested Irregular Waves (Computer Program SRIW)
AD-A033 339/3CP

SPD-735-01
Hydrodynamic Performance of the Model of a Variable Area Waterjet Inlet Designed for a 200 Ton, 100 Knot Hydrofoil Ship
AD-A038 590/6CP

SPD-737-02
User's Manual for a FORTRAN IV Computer Program for Calculating Propeller/Stern Boundary-Layer Interaction on Axisymmetric Bodies
AD-A037 063/5CP

SPD-770-01
Design of the Stern Control Surfaces and Prediction of the Motions of the Dolly Varden Buoyant Rise Test Vehicle
AD-A040 311/3CP

SPD-771-01
Calculation of Streamlines on the USNS DUTTON
AD-A040 713/0CP

SPD-789-01
A Review of Resistance Prediction and Design Methods for Strut-Pod Inlets
AD-A052 710/1CP

SPD-798-01
Ship Motion and Flexure Data Base for the CG-26
AD-A046 877/7CP

SPD-800-01
Analytical Ship Residuary Resistance Prediction
AD-A051 322/6CP

DEFENCE RESEARCH ESTABLISHMENT ATLANTIC DARTMOUTH (NOVA SCOTIA)

DREA-TM-78/B
PHHS. A Fortran Programme for Ship Pitch, Heave and Seakeeping Prediction
AD-A056 554/9CP

DEFENSE SYSTEMS MANAGEMENT SCHOOL FORT BELVOIR VA

Software Management for Shipboard Computer Systems
AD-A035 161/9CP

DRAPER (CHARLES STARK) LAB INC CAMBRIDGE MASS

R-775
Mooring Mechanics - A Comprehensive Computer Study. Volume I. Three Dimensional Static Analysis and Design of Single Point Taut and Slack Moored Buoy Systems. Part I. Surface Mooring Lines. Part II. Subsurface Mooring Lines
AD-771 367/0CP

DYNAMICS TECHNOLOGY INC TORRANCE CALIF

DT-7606-4
An Analytical Study of the Effect of Surface Roughness on Boundary-Layer Stability
AD-A048 465/9CP

ENGINEERING RESEARCH ASSOCIATES TORONTO (ONTARIO)

ERA-53-6
A Program to Calculate the Pressure Distribution on a Hydrofoil with Pod and Strut
AD-727 588/CP

FARRELL LINES, INC., NY.

Long Range Fleet Planning Study Vessel Configuration System (Trade Route 27). Volume I: Report
(MA/RD-930-79007A)
PB-286 655/6CP

Long Range Fleet Planning Study Vessel Configuration System (Trade Route 27) Volume II: Appendix
(MA/RD-930-79007B)
PB-286 656/4CP

GENERAL AMERICAN TRANSPORTATION CORP NILES ILL GENERAL AMERICAN RESEARCH DIV

Application of Cycloidal Cam Type Speed Reducers to Marine Gas Turbine Engines
AD-754 822/CP

GENERAL DYNAMICS CORP GROTON CONN ELECTRIC BOAT DIV

U443-77-085
Analytic Modeling of Heat Flow and Structural Distortion in Ship Structures Produced by Welding
AD-A048 227/3CP

GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND DEVELOPMENT CENTER

SRD-73-022
Cryogenic Systems and Superconductive Power
AD-758 431/CP

HAMILTON STANDARD WINDSOR LOCKS CONN

HSER-5834
Noise Detectability Prediction Method for Low Tip Speed Propellers
(AFAPL-TR-71-37)
AD-729 432/CP

HSER-5835
User's Manual for Propeller Noise Detectability Program
(AFAPL-TR-71-38)
AD-729 435/CP

HAWAII UNIV HONOLULU

Program 'TRANSHIP' - A Computer Program for the Design of the Midship Section of a Transversely-Framed Dry Cargo Ship. Part II
(SSC-216)
AD-753 531/CP

HYDRONAUTICS, INC., LAUREL, MD.

The Development and Validation of a Mathematical Model for the Design of Protection Barriers for Nuclear Powered Ships
(MA-RD-920-78037)
PB-284 174/0CP

Input Data Instructions - Simplified Documentation of the Computer Program ANSYS
(MA-RD-920-78035A)
PB-284 193/0CP

HYDROSPACE-CHALLENGER INC ROCKVILLE MD

HCI-TR-4557-0001
The Configuration and Loading of a Torisonally Elastic Faired Cable
AD-768 319/6CP

IOWA INST OF HYDRAULIC RESEARCH IOWA CITY

IIHR-133
Experimental Procedure for the Determination of Wave Resistance in a Towing Tank
AD-733 683/CP

J G ENGINEERING RESEARCH ASSOCIATES BALTIMORE MD

0-75-1
Sound Radiation from an Orthotropic Plate Supported by a Double Set of Stiffeners
AD-A013 320/7CP

TR-ON-18
Far Field Sound Patterns from Anisotropic Cylindrical Shells under Lateral Point Loading at Low Frequencies
AD-735 133/CP

Impulsive Response of a Stiffened Plate Mass Loaded Around the Edges
AD-742 086/CP

LAROCK (BRUCE E) DAVIS CALIF

TR-7201
Transverse Gravity Effects on a Fully Cavitating Hydrofoil Running Below a Free Surface
AD-746 484/CP

LOGISTICS MANAGEMENT INST WASHINGTON D C

LMI-72-15-Mar 73
Assessment of Patrol Frigate Maintenance Policy. Computer Simulation of a Rotatable Pool for the PF
AD-761 159/CP

LOS ALAMOS SCIENTIFIC LAB., N.MEX.

CONF-770910-1
Nonlinear Hydrodynamic Forces on Floating Bodies
LA-UR-77-437

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. DEPT. OF NAVAL ARCHITECTURE AND MARINE ENGINEERING.

70-3
Computer Aided Prediction of Seakeeping Performance in Ship Design
(MA-RD-900-71-8)
COM-71-00590/CP

70-18
Post-Buckling Behavior of Stiffened Plates with Small Initial Curvature under Combined Loads
AD-726 455/CP

70-19
Computation of Periodic Propeller Forces in Non-Uniform Flows Using a Lifting Surface Model
AD-718 898/CP

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF OCEAN ENGINEERING

74-7
Unsteady Hydrodynamics of a Body of Revolution with Fairwater and Rudder
AD-A003 009/8CP

74-14
Wave Resistance of Asymmetric Pressure Distributions Moving in a Canal
AD-A005 650/7CP

74-15
A Lifting-Surface Program for Trapezoidal Control Surfaces with Flaps
AD-785 247/8CP

75-4
Determination of Damping Coefficients of Swath Catamaran Using Thin Ship Theory
AD-A031 293/4CP

OE-74-8
Hydrodynamics of a Body of Revolution with Fairwater and Rudders at a Constant Angle of Attack
AD-A001 750/9CP

TR-81512-1
A Numerical Method for Two-Dimensional, Cavitating, Lifting Flows
AD-A016 953/2CP

Development of Analytical and Empirical Systems for Parametric Studies of Design and Fabrication of Welded Structures
AD-A050 908/3CP

An Experimental Investigation of Wall Effects on Supercavitating Hydrofoils of Finite Span
AD-A056 090/4CP

MASSACHUSETTS INST OF TECH CAMBRIDGE MAN-MACHINE SYSTEMS LAB

Human and Computer Control of Undersea Teleoperators
AD-A057 655/3CP

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. MARINE INDUSTRY ADVISORY SERVICES.

MITSG-78/13
Computer-Aided Preliminary Design of Ships
(NOAA-78082103)
PB-286 238/1CP

OPPORTUNITY BRIEF-13
Computer-Aided Preliminary Design of Ships
(NOAA-78082103)
PB-286 238/1CP

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. SEA GRANT PROJECT OFFICE.

MITSG-74-31-App
Port Design and Analysis Methodology. Appendix
(NOAA-75011403-App)
COM-75-10345/7CP

MITSG-76-10
A Hybrid Element Method for Calculating Three-Dimensional Water Wave Scattering
(NOAA-76111006)
PB-262 040/9CP

MASSACHUSETTS UNIV., AMHERST. ENERGY ALTERNATIVES PROGRAM.

NSF/RANN/SE/GI-34979/TR/75/11
On the Minimization of the Ocean Thermal Differences Machine Vehicle Sea Motions
(NSF/RA/N-75/121)
PB-247 176/1CP

MASSACHUSETTS UNIV AMHERST SCHOOL OF ENGINEERING

THEMIS-UM-71-3
Penetration Reinforcement Design for Spherical Pressure Hulls
AD-728 772/CP

UM-72-3
Laboratory Modelling of Structural Response to Ocean Wave Excitation
AD-743 069/CP

UM-72-11
Calculation of Inlet Flows by Means of a Closed Vorticity Distribution Applied to Ducted Propellers
AD-754 114/CP

UM-73-7
Experimental Determination of Strain Concentrations near an Unreinforced Hole in Orthotropic Shells
AD-767 046/6CP

MICHIGAN UNIV ANN ARBOR DEPT OF NAVAL ARCHITECTURE AND MARINE ENGINEERING

02148
Automatic Creation of Fair Ship Lines
AD-724 347/CP

NATIONAL OCEANOGRAPHIC DATA CENTER, WASHINGTON, D.C.

Computer Programs in Marine Science
(NOAA-76062212)
PB-258 082/7CP

NAVAL ACADEMY ANNAPOLIS MD

USNA-TSPR-55
Naval Shipyard Performance Evaluation
AD-785 188/4CP

NAVAL AIR ENGINEERING CENTER PHILADELPHIA PA ENGINEERING DEPT (SI)

NAEC-ENG-7695
Carrier Aircraft Operational Compatibility System (CAOCS - MOD 2) Computer Program
AD-732 755/CP

NAVAL COASTAL SYSTEMS CENTER PANAMA CITY FLA

NCSC-TM-232-78
Trade-Off Analysis of Propulsion Systems for Submersibles (TAPSS)
AD-A056 617/4CP

NCSC-TM-237-78
Development and Application of a Multiloop, Laplace Domain Analysis Technique to Control System Design for Underwater Vehicles
AD-A057 190/1CP

NAVAL COASTAL SYSTEMS LAB PANAMA CITY FLA

NCSL-TR-327-78
Prediction of Acceleration Hydrodynamic Coefficients for Underwater Vehicles from Geometric Parameters
AD-A052 718/4CP

NCSL-220-74
The Midcohv Weight and Balance Computer Program (WTBAL)
AD-A001 279/9CP

NCSL-242-75
The Analysis of a Longitudinal Control System for Underwater Vehicles
AD-A021 838/8CP

NAVAL CONSTRUCTION RESEARCH ESTABLISHMENT DUNFERMLINE (SCOTLAND)

NCRE/R.564
Three Dimensional Supertanker Computer Programs
(NSTIC-30025)
AD-743 743/CP

NCRE/R.565
Computer Programs for Statistical Analysis of Extreme-Value Strain Data
(NSTIC-28714)
AD-719 938/CP

NCRE/R630
SPAN: A Computer Program for Static and Dynamic Analysis of Stiffened Plates and Grillages
(DRIC-BR-50857)
AD-A026 865/6CP

NCRE/R630-ADD
SPAN: User's Summary. Addendum
(DRIC-BR-57609)
AD-A047 021/1CP

NAVAL ORDNANCE LAB WHITE OAK MD

NOLTR-72-177
A Method of Efficiently Calculating the Temperature Distribution History in Structural Elements Exposed to the Thermal Radiation Pulse of a Nuclear Weapon Explosion
AD-753 462/CP

NAVAL POSTGRADUATE SCHOOL MONTEREY CA

Multivariable Control of a Marine Boiler
AD-A061 282/0CP

NAVAL POSTGRADUATE SCHOOL MONTEREY CALIF

NPS-69-77-001
A Feasibility Study of Heat Transfer Improvement in Marine Steam Condensers
AD-A048 783/5CP

NPS-69-77-002
Marine Steam Condenser Design Using Numerical Optimization
AD-A049 953/3CP

Maneuvering Characteristics of Automatically Controlled Ships with Directionally Unstable Hulls
AD-A003 788/7CP

Refinements of the Seal Subroutines and Fan Air Flow Maps for the XR-3 Loads and Motion Program
AD-A004 616/9CP

The Simulation of Hydrofoil Performance
AD-A005 463/5CP

Harmonic Motion of Cylinders in Uniform Flow
AD-A012 412/3CP

A Simulation of a Computer Graphics-Aided Aircraft Handling System
AD-A012 418/0CP

Control of Nuclear Propulsion Plant Power Transients
AD-A012 458/6CP

A Computer Model to Assess Financing Provisions of Naval FPIF Shipbuilding Contracts
AD-A018 914/2CP

Study of the Roll and Pitch Transients in Calm Water Using the Simulated Performance of the XR-3 Surface Effect Ship Loads and Motions Computer Program
AD-A021 832/1CP

A Study of Pressure-Volume Rates and Plenum Membrane Additions to the Captured Air Bubble Surface Effect Ship XR-3 Digital Computer Loads and Motion Program
AD-A026 397/0CP

Microcomputer Based Pitch and Depth Controller for a Submarine Using Optimal Control Theory
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Microcomputer Application to Compute a Ship's Draft and Longitudinal Stress
AD-A038 810/8CP

A Shipboard Report Origination System Utilizing a Microcomputer
AD-A038 811/6CP

Sensitivity Study of the XR-3 Loads and Motions Computer Program Sidewall Parameters and Forces on Roll Behavior in Calm Sea and a Comparison to Testcraft Turn Maneuver Data
AD-A042 176/8CP

Investigation of a Linear, Two-Degree-of-Freedom Simulation of the XR-3 Captured Air Bubble (CAB) Craft in the Frequency Domain
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Optimal Design of Submersible Frame Stiffened, Circular Cylindrical Hulls
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Extended Structural Synthesis Capability for Automated Design of Frame-Stiffened, Submersible, Circular, Cylindrical Shells
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